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MERCHANDISE
MANUAL
SERIES

JEWELRY AND SILVERWARE

KENNARD

Courtesy of International Studio

Comb in Gold and Horn (French Design)

MERCHANDISE MANUAL SERIES

JEWELRY AND SILVERWARE

BY

BEULAH ELFRETH KENNARD, M.A.

Editor of Series; formerly Director of Department Store Courses, New York University; Chairman of Committee on Merchandise Courses for New York City Public Schools; Educational Director, Department Store Education Association

ASSISTED BY

E. LILLIAN HUTCHINSON

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NEW YORK

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This Series is Dedicated

to Mrs. Henry Ollesheimer, Miss Virginia Potter, and Miss Anne Morgan, who desiring to give greater opportunity for advancement to commercial employees and believing that all business efficiency must rest upon a solid foundation of training and education gave years of enthusiastic service to the testing of this belief.

MERCHANDISE MANUAL SERIES

EDITOR OF SERIES

BEULAH ELFRETH KENNARD, M.A.

Formerly Director of Department Store Courses, New York University; Chairman of Committee on Merchandise Courses for New York City Public Schools; Educational Director, Department Store Education Association

CONSULTING EDITOR

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EDITOR'S PREFACE

As "Department Store Merchandise Manuals" these books were originally written for salespeople and were designed to give them reliable information concerning the sources and manufacturing processes of the merchandise which they handle. When it was necessary to deal with scientific or historical material it was treated as simply and concretely as possible and the point of view taken was that of business rather than that of the school or laboratory. In this form they have proved their practical value not only to the department store salesperson but in the specialty shop. It has been pointed out, however, that the material has a wider scope than that of sales manuals alone.

As reference books, librarians will find the short, clear statements and full indexes invaluable.

As an encyclopædia of merchandise the series contains scientific information in a simple, compact form which makes it available for children and others to whom the subjects treated are unfamiliar.

As textbooks they are adapted for use in commercial schools, high schools, night schools, settlement classes, and by teachers of household arts and domestic science.

As source books for practical story-telling, kindergartners, primary and vacation school teachers will find in them an abundance of interesting material for short "true" stories on the various industries and crafts, the manufacture of household articles, such as pins and needles, as well as the making of pottery, glass, and steel. These manuals contain just the material often hunted for in vain by teachers and librarians.

As household helps and shopping guides the young housekeeper will find the manuals her best friends because they not only describe the manufacturing processes but tell her how to distinguish well-made articles of good materials from the inferior and badly made. They also tell her how to care for the clothing or household goods which she has bought.

For salespeople and storekeepers they supply the general and specific information about their merchandise which is indispensable to efficiency, yet very hard to gather from the scattered sources upon which they now depend.

These changes should enlarge the usefulness of the manuals without losing any of their specific value in the field of salesmanship.

We wish to express our grateful appreciation to the manufacturers and experts who have given us such valuable counsel and cordial co-operation.

BEULAH ELFRETH KENNARD

AUTHOR'S PREFACE

This manual is an introduction to the merchandise of the Jewelry Department. On account of the scope of the subject it has been necessary to treat some sections in outline form, which, while giving the important facts, has necessitated the omission of many details. To the orginal outline six chapters have been added which treat of silverware, clocks, and ornaments, but optical goods are omitted and watches only given a brief reference as they would require a technical treatment inconsistent with the purpose of the series. Those who buy or sell jewelry and silverware will, we hope, be stimulated to continue the study of the fascinating merchandise of which this is a brief survey.

Acknowledgment is gratefully made to Mr. Emil A. Kohn, Manufacturing Jeweler; Mr. S. L. Van Wezel, Diamond Merchant; Mr. August Goldsmith of Goldsmith, Stein and Company, Manufacturing Jewelers; Mr. T. Edgar Willson, Editor of the *Jeweler's Circular Weekly;* Espositor, Varni Company; and especially to Mr. Julius Wodiska, the author of "Book of Precious Stones" and to Mr. W. C. Codman of the Gorham Company for co-operation in securing accurate information and for many helpful criticisms.

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THE JEWELRY DEPARTMENT

The Universal Appeal of Jewelry

Jewelry is one of the most fascinating types of merchandise and the well-informed person wishes to be intelligent on the subject. It makes an artistic and sentimental appeal rather than filling a practical purpose. Almost everyone welcomes information about precious stones and is hardly less interested in the precious metals and the fine workmanship of the artist in gold or silver.

The beautiful things associated with jewelry such as fans, watches, and beaded or mesh bags for personal use, and clocks and bronzes for decoration, form subjects of permanent interest and charm.

Divisions of the Department

Jewelry may be divided according to purpose into:

Jewelry for Women:

Rings	Watches (Wrist, Pendant)
Brooches	Mesh Bags
Bar Pins	Lorgnettes
Collars	Novelties
Pearl Necklaces	Fans
Pendants	Combs and Hair Ornaments
Earrings	

Jewelry for Men:

Rings (Jeweled, Seal)	Pencils
Scarf-Pins	Knives
Watch Chains	Cigar Cutters
Cuff-Links	Cigarette Cases
Studs	Match Boxes
Dress Sets	

The jewelry stock may also be divided into:

1. Gold and platinum jewelry, set with real gems.

2. Plated and novelty jewelry, of rolled gold, silver, copper, or less costly metals, set with imitation stones.

There is almost infinite variety in the forms and decorations of the various articles. They may be elaborately designed and set with precious stones or plainly chased and simple. But the one requirement of all jewelry is that it should be beautiful.

Part I—Metals

Chapter II

GOLD

Popularity

Gold is the most beautiful of all metals. It is soft and easily worked, and combines artistically with any color found in precious stones. Silver and platinum are also used for jewelry, and copper and bronze are seen in "craftsman's" work, but gold is used more than all the others combined.

Color

Pure gold is pale yellow with a bright luster, but by combination with other metals in the form of alloys it may be given a darker yellow tone or a green, gray, or red hue. Gold can also be made to resemble platinum in color. This variety is called "white gold."

Characteristics

Gold is:

Malleable — may be beaten into thin sheets.

Ductile — may be drawn into fine wire.
Unalterable — does not corrode, as iron and copper, on exposure to the air.
Dense — the particles are very close together.
Soft — easily wears away and must be hardened by the addition of copper, silver, etc.

Gold may be beaten into a sheet 1/250,000 of an inch in thickness. In this form it is known as gold leaf, and is used for gilding.

Source

Gold is found in small quantities all over the world. The rocks and soil of nearly all countries, and even the waters of the ocean, contain small particles of gold scattered through them. The Australian and Californian deposits are remarkably pure.

Gold is found in "ore" or in "barren rock." These differ only in the proportion of gold which they contain. Ore is "paying rock," that is, rock which has enough gold in it to make its extraction and refining profitable. With the improvements in methods of gold mining, barren rock may become paying rock and the poorer fields must be worked as the richer ones give out. Gold, like iron, is a part of the earth's crust, but is unevenly distributed. At present, the rich ores are very rare, because it has been prized by man in every part of the world, and as a result the

ore which could be secured by such simple methods as washing river sands has disappeared, except in out-of-the-way places. Gold is found under three conditions:

1. As a deposit in the sands of rivers.
2. As lodes or veins.
3. As sedimentary deposits.

Extracting Gold from Sand

The gold which is found in river sand is most easily secured. It is separated from the sand by various methods of washing.

1. The sand may be washed in a wooden tub, or iron basin which is shaken to and fro by hand until the gold (being heavier than sand) falls to the bottom.

2. The gold may be separated by a flowing stream of water which removes the sand, the gold being caught on some obstruction. There are two variations of this method.

For large operations the sand or gravel may be put in a long trough called a "sluice" through which a stream of water runs. The gold falls to the bottom and is caught on cross strips of wood called "riffles," while the sand is carried off by the water. For smaller operations the gravel is thrown into a current of water in a "Long Tom," which is a box about four yards long and seven inches broad. The gold is caught on riffles or on sheep's fleece.

These methods of collecting gold are slow and wasteful, but are profitable so long as a rich deposit lasts.

3. The Hydraulic Method. The hills in certain parts of California were found to contain a large amount of gold, and in 1852 a new method of reducing these hills was introduced. Instead of slowly digging up the soil, the mining companies erected a high steel framework or "giant" supporting a hose pipe through which water was driven at very high pressure against the sides of the hills. This stream of water was extremely powerful. It sent a torrent of mud down into the valley below, where the mud flowed through sluices, and the gold was caught in the same way as from the river sand.

The hydraulic method had two great objections: first, the mud dammed up the valleys and destroyed land which was good for farming or fruit raising; and second, the débris was left on the land.

In 1884 a law was passed prohibiting hydraulic mining in California, but it is still practiced in some other states.

In the frozen regions of Siberia and the Klondike the ground is too hard to be broken up by the pick and therefore fires are built or steam pipes are inserted in order to melt the ice before the actual mining can begin.

Extracting Gold from Lodes or Veins

Gold which is found in lodes or veins has been carried up from a lower part of the earth's crust by hot volcanic vapors. The metal, which had dissolved in the hot water, crystallized and was deposited in veins.

These lodes may be vertical, slanting, or horizontal. They are mined in the same way as other metals, by sinking shafts with connecting galleries. In a gold mine, however, no part of the paying rock is left for supports or chamber walls as in coal mines. As the various sections are removed the space is filled with a wooden framework containing crushed rock until the ore has been entirely replaced.

Crushing the Ore

Gold is seldom found in the pure state. It may be combined with iron, silver, tourmaline, copper, galena, sulphur, or other substances. In order to separate it from the rock, the ore must first be crushed into powder. If the gold is "free" or unmixed with quartz, it is not necessary to reduce the rock to such fineness.

There are several kinds of machines used for crushing the ore:

1. The jaw breaker, which has two steel jaws with toothed edges. One of these jaws is sta-

tionary and the other moves backward and forward over it.

2. Vertical stamps in batteries, which are raised by a cam shaft and fall with a deafening din upon the ore which is contained in an iron mortar.
3. The tube mill is a large cylinder containing crushing materials which grind the ore still finer.

Separating the Gold from the Ore

There are three methods of separating the gold from this crushed ore. These are:

Amalgamation
Chlorination
Cyaniding

Amalgamation

The amalgamation process depends upon the ease with which mercury and gold combine.

The crushed ore or "pulp" is mixed with water and run over copper plates coated with mercury to which the gold adheres. The combined gold and mercury — called amalgam — is scraped off and the gold separated from the mercury by distillation.

Chlorination

In the chlorination process the crushed rock is

roasted, mixed with water, and exposed to the action of chlorine gas, which is obtained from common salt by an electrical process. The chlorine and gold unite, and the gold is precipitated from this solution.

Cyaniding

Cyaniding is the most economical method and has almost entirely superseded the others. The crushed ore is dissolved in a very dilute solution of potassium cyanide. The gold is precipitated from this solution either by electricity or by zinc.

Bullion

These processes complete the work which is done at the mine or gold field. The metal, which is now called bullion, is then sent to some center in Europe or America to be further refined.

Alloys

Manufacturing jewelers buy their gold in bars by the ounce and alloy [1] it themselves.

As stated earlier in the chapter, when gold is combined with other metals to form an alloy, its color is affected. Silver makes it lighter in color and copper gives it a reddish hue. Alloys of gold, in addition to being different in color, are naturally cheaper than pure gold, and they are also harder.

[1] For a further discussion of alloys, see Chapter V.

Pure or " fine " gold is described as " 24 karats fine." The karat is a standard of weight for the precious metals and gems, but it has a special significance with respect to gold. Twenty-four karats fine means that gold has no alloy whatever; but such gold is too soft for use. Twenty-two karat gold has 2 parts alloy and 22 parts gold. Old jewelry was usually of 22 karat gold. Eighteen and 14 karat gold are now much used, and the gold used in cheaper jewelry is only 10 karat gold, that is, more than half its weight is some other metal. As these cheaper alloys contain a larger amount of copper than the finer forms, they are easily affected by acids and have a less brilliant luster.

Testing Gold

Jewelers have a simple method of testing the fineness of gold by the use of a hard black stone called a " touchstone." The piece to be tested is rubbed on the stone. It leaves a little streak of metal behind, the color of which is compared with that of a streak made by gold of known quality. The touchstone method is easy but is not absolutely accurate. Gold is also tested with nitric acid.

Assaying

The scientific testing of the quality of gold is done by a process of analytical chemistry called assaying. First, a very small portion of the gold is weighed in a delicate balance. Then it is wrapped in pure sheet lead and heated. The lead unites with all baser metals as it melts and this combination runs away, leaving only a lump of pure gold and silver. This lump is weighed again to see how much base metal it had contained, after which the silver is removed with nitric acid and only the pure gold is left. The difference between the weight of this remainder and the lump containing silver determines the weight of the gold. It can be calculated to a thousandth part of a karat.

Uses of Gold

In spite of the new gold fields which have been discovered from time to time, the world has never had enough gold. The insistent demand keeps its price steady and helps to make it the standard for other values.

Gold is used in dentistry, in chemical works and photography, as well as in gilding and making all kinds of lacquers. Nearly one-half of the output is used for money. Several years ago it was estimated that in the United States 24 per cent was used for jewelry, 10 per cent for watch cases, 44 per cent for coinage, and about 22 per cent for export and for other purposes.

Chapter III

PLATINUM

Rarity

The most costly of all useful metals is platinum, which in normal times is about two and one-half times as valuable as gold. Platinum was at one time considered impure silver — only fifty years ago Russian peasants wore buttons of platinum on their clothes — but when its peculiar properties became known it began to be greatly prized because of its rarity.

Color

The color of platinum is a glistening blue white. It is now in greater favor than gold for setting diamonds and other jewels, as it seems to increase their brilliancy.

Characteristics

Platinum is:

Malleable and ductile to a high degree.
Less affected by acids than gold.
Dense.
Soft as silver.

Platinum does not oxidize at any temperature, and melts only at a very high temperature. An oxygen torch which produces very intense heat is needed for this purpose.

Source

Platinum is found chiefly in the Ural Mountains in Russia, but it appears also in Canada, New South Wales, Colombia, Borneo, Sumatra, and the United States, and there are traces of it in Lapland, Norway, and Ireland. Russia, however, has more than twenty times as much platinum as has been found in the rest of the world and the metal is found in a form that may be easily worked.

Uses

The use of platinum for fine jewelry is only limited by the supply of this rare metal. Large quantities are also used in dentistry, for incandescent lamps, and for electric and scientific instruments.

Its indestructibility has made it the ideal material for crucibles and dishes in chemical laboratories. Articles made of platinum are all marked and the mark is recorded together with the weight so that they may be recovered if stolen. The extreme difficulty with which platinum is melted makes its detection comparatively sure. During the European War

it was so much needed for munitions that all other uses were restricted and jewelers were asked to discontinue the manufacture of platinum jewelry. After the war a certain amount of platinum was released, but the unsettled condition of Russia still cut off the major source of supply. The price continued to advance. While in 1918 platinum was worth five times as much as gold, in October, 1920, it was worth seven times as much.

In order to meet the scarcity of platinum it is sometimes alloyed with palladium or iridium, two metals of the platinum group which are also very rare and costly. White gold, which is substituted for platinum in jewelry, is only superficially like it and is far less durable.

In September, 1920, a law was passed in New York State requiring that all articles marked "platinum" must assay .925 fine of metals of the platinum group.

Chapter IV

SILVER

Description of Silver

Silver is a brilliant white metal which sometimes occurs in nature in the form of twisted wire-like deposits in the upper levels of silver-bearing minerals. It is usually associated with gold, sulphur, or lead, and these silver ores are more important than native silver deposits. It is the most common of the precious metals and is easily separated from its alloys.

Characteristics of Silver

Silver is:

Harder than gold, but too soft to use without being alloyed with copper or some other metal.
Malleable and ductile.
The best conductor of heat among all of the metals.
Tarnished by sulphur compounds, but unaffected by pure air.

Sources of Silver

Mexico and Peru furnish a large part of the world's

silver, but in recent years the United States and Canada have produced the largest amount. Silver is also mined extensively in Cornwall, England, and in Central Europe, Asia, Australia, and Africa.

Extracting from the Ore

Silver ore from the mines is crushed with batteries of stamps, then mixed with water and shaken on tables or in agitators which cause the heavier metal to fall to the bottom. The pulp is passed over a magnetic pulley, which draws out the steel and iron, and is "dewatered" by means of screens. The process of crushing, mixing with water, and concentrating is repeated until the ore is very fine, being finally ground in a tube mill (see page 8). It is then cyanided to extract it from metallic compounds and precipitated as a silver sulphide. For the process of desulphurizing it is put in revolving cylinders filled with ingots of aluminum. The motion of the cylinders produces hydrogen, which extracts the sulphur.

Another method of separating the metallic ore from the rock is called "flotation." When the ore has been crushed and mixed with water a quantity of oil is added and the slimy pulp is floated over water in "flotation cones." The oil attaches itself to the mineral, enclosing tiny air bubbles which cause it to rise to the surface of the water where it is skimmed

off. The mass flows through a series of compartments where this process is repeated. By alternately shaking it so that it is thoroughly aerated and allowing it to settle while the froth rises to the surface, all the metal is recovered. This method requires less space and less elaborate machinery than the ordinary process.

Uses of Silver

Besides the use of silver in jewelry and silverware and as an alloy of gold it is valuable in commerce, art, and science. An alloy of silver is used in filling teeth and a solution of silver makes the only true "stain" for glass, producing a beautiful golden yellow.

The women of India and other eastern countries are loaded with silver jewelry from their filigree headdresses to their silver anklets which sometimes weigh twenty ounces each. Long silver chains are worn in Scandinavia and Russia. In the Balkans, Persia, and Japan, silver is used to ornament weapons and the temples of India have silver-plated doors and domes.

The chief use of the metal is in coinage. Many countries employ it instead of gold as the standard of values.

Sterling silver has the same proportion of alloy as United States coins, that is, 92 ½ per cent pure silver and 7½ per cent of alloy.

Chapter V

ALLOYS

Definition

An alloy is a combination of two or more metals produced by fusion. An alloy of gold, platinum, or silver means a combination of gold, platinum, or silver with any of the baser metals.

The metals chiefly used in alloying the precious metals are:

With gold — silver, copper, or nickel.
With silver — tin, zinc, lead, or copper.
With platinum — palladium, iridium, or silver.

Purposes

When metals are alloyed, their good qualities seem to combine. When copper, silver, or nickel are added to gold, they increase its strength and toughness without destroying its beauty or metallic luster, unless an excess of metal is used. Gold and silver possess all the qualities, except hardness, necessary for making beautiful jewelry. Pure gold is so soft that it is practically unusable.

Pure gold cannot be affected by any gases or impurities in the air or water; silver is only affected by sulphur; but copper will corrode under ordinary atmospheric conditions. Gold which contains a large amount of copper will in hot weather leave a green mark on the skin. Platinum is unalterable by the air or even by acids under ordinary conditions but the "white gold" imitation of platinum contains silver and nickel which are attacked by sulphur or acids.

Metals are also alloyed to modify their color and to cause them to melt more easily. A solder must have a lower melting point than that of the metal to be soldered. Gold and silver solders are made by adding copper and silver to the first and copper to the second. An alloy may have a melting point even lower than that of either of the metals of which it is composed as in the case of tin and lead which are combined to make "soft solder."

One obvious reason for alloying the precious metals is to reduce the cost of material.

Preparation

The metals used are selected and carefully weighed so that the proportions of the alloy may be exactly right.

The metal having the highest melting point is melted first in a crucible made of porcelain, plumbago, or

fire-clay according to the nature of the metal. The metals more easily melted are then added and the mixture stirred until it is thoroughly melted and mixed together. Sometimes a "flux" is added to remove the impurities of the metals. Fluxes may be of charcoal, borax, carbonate of soda, common salt, sulphur, or powdered glass.

Fluxes are materials or combinations of materials which have a low melting point. They are used to assist in melting other materials and also to carry off impurities with which they mix or combine as they melt.

The mixture is then poured into a mold to be cooled. The ingot or bar of alloy should have the same weight when cooled as that of all the metals composing it.

Part II—Precious Stones

Chapter VI

GROUPING STONES BY COLOR

First Steps in Learning the Stones

The task of becoming acquainted with precious stones is a bewildering one. There are many stones of similar appearance which have different names and different values. On the other hand the same stone may appear in a number of different colors. One must not only be able to distinguish a diamond from a white sapphire, but also to know that there is a white sapphire and a yellow and a purple one as well as the beautiful blue stone which is called by that name.

The most direct way to study and become acquainted with precious stones is, first of all, to group them mentally by colors, noticing the leading or typical stone of each group, and comparing similar stones with it. This method of grouping will also help in making ar-

rangements of definite color schemes, especially the harmonizing of jewelry with costumes which is a custom now in vogue. Women who can afford it, use jewels for every gown, and ornaments for afternoon as well as evening wear.

In each of the following color groups it will be noticed that there are opaque as well as transparent stones.

Colorless Stones

The *diamond* is the representative stone of this group, although it is found in a wide range of colors — yellow, green, pink, less often red and blue. Its surpassing quality is its property of dividing light into colored rays. This wonderful brilliancy is termed "fire." Its fire and hardness (it is the hardest of all known substances) are the two characteristics which distinguish the diamond from other colorless stones.

The *zircon,* also called *jargoon,* approaches the diamond more nearly than any other stone in brilliancy.

The *white sapphire* is very hard, ranking next to the diamond in this respect; but its luster is much softer than that of the diamond.

The *white topaz* takes a very high polish and thus resembles the diamond in the daytime.

Bristol diamonds, and *Lake George diamonds* are forms of rock crystal, used for imitating diamonds.

Tourmaline, phenacite, spinel, and *beryl* are other colorless stones less often seen.

The *moonstone* is an opalescent, opaque, white stone easily distinguished by its soft bluish light.

The *white opal* is also easily distinguished by its play of lights.

White coral and *white jade* are clear, opaque white stones.

Red Stones

The *ruby* is the most beautiful and the most costly of the transparent red stones, being more expensive than the diamond, especially in the pigeon's blood hue. The ruby is very hard.

The red *garnet,* red *spinel,* red *tourmaline* and red *quartz* are so like the ruby as often to be mistaken for it. These stones are softer than the ruby.

The *fire opal* may be called a red stone, as red is its predominating tint. This cannot be confused with any of the other red stones because of the play of light in it.

The *carnelian,* which is the color of raw flesh, is an opaque stone often seen in signet rings.

Jasper is a bright red, opaque stone.

Coral is found in all shades of red, from very light, almost pink, to deep red. It is opaque.

Green Stones

The *emerald* has been so universally accepted as *the*

green stone that the word emerald is now a general trade designation for various transparent precious and semiprecious green stones, and is not simply the name of any one specific stone. The *true emerald,* however, is a form of the mineral beryl, and is a very valuable gem, even more expensive than the diamond or ruby.

The green *garnet* (called olivine), *peridot, chrysoberyl,* and *tourmaline,* are emerald-green stones very often seen.

The *aquamarine* is distinctly different from these others in its sea-green color.

The opaque green stones include:

Malachite, a bright green stone with a silky luster.

Chrysoprase, leek or apple-green.

Bloodstone, distinguishable by its bright blood-red spots.

Serpentine, varying from rich olive to pistachio.

Variscite, rich green usually cut with the matrix, the rock in which it is embedded.

Jade, a very hard Chinese stone.

Blue Stones

The *sapphire* of the cornflower-blue shade is the most valuable and beautiful transparent blue stone. It is much harder than any other stone of this color.

Blue *topaz* and blue *tourmaline* (indicolite) are similar in color but less frequently seen.

Lapis lazuli and *azurite* are beautiful deep blue opaque stones.

The *turquoise* is distinguished by its robin's egg or greenish-blue color.

Yellow Stones

The *topaz* is instantly thought of as the typical transparent yellow stone, though the topaz may be of any shade. It has a brilliant luster.

The *yellow sapphire* is very like the topaz, but much harder.

The *yellow spinel* is a transparent stone less often seen.

Amber is a rich yellow and may be either transparent or translucent.

Chrysoberyl appears in different shades of yellow.

Citrine (yellow quartz) resembles the topaz, but is much softer.

Hyacinth, or *jacinth,* are forms of zircon of a deep yellow tint.

Violet or Purple Stones

The *amethyst* is practically the only purple stone in general use. This is seen in all shades of purple.

The *purple sapphire* is almost identical in color with the amethyst but is very rare.

A *violet spinel* is sometimes seen.

Pink Stones

Pink stones are rather rare.

Kunzite is a beautiful, lilac-colored transparent stone.

The *ruby, beryl, tourmaline, spinel* are sometimes seen in a pink shade.

The *topaz* becomes pink when heated.

Coral, in a large variety of shades, and *rhodonite,* often containing black markings, are opaque pink stones.

Brown Stones

Brown stones are not very popular.

The *hyacinth* is a yellowish-brown transparent stone.

The *garnet* and *tourmaline* are also found in brown.

Cairngorm or *smoky quartz* is a rich yellow-brown.

Black Stones

Jet, either in its dull or highly polished form, is a familiar substance in the Jewelry Department.

Black tourmaline, garnets, and *quartz* are sometimes seen.

Black onyx is used in mourning jewelry.

Chapter VII

VALUATION OF PRECIOUS STONES

Popular Misconceptions

After one has learned to know the stones of the various color groups, he should next become familiar with the values of the stones. Popular information on this subject is very inaccurate. For example, most people suppose that the diamond is the most valuable stone on the market, while in reality there are two stones ranking above it in value — the ruby and the emerald.

Again, it is popularly supposed that gems may be divided by a hard and fast line into " gems," " precious stones," and " semiprecious stones," but this again is an error, for scarcely two authorities will agree upon a classification. Some classify them according to mineral composition, others according to rarity, others according to transparency or lack of transparency, others by hardness, others by the popular demand and fashion.

Essential Characteristics of Stones

All agree, however, that there are three character-

istics which precious stones should possess, viz., beauty, durability, and rarity, and unless they do possess these essentials they cannot be satisfactory as precious stones. For instance, there are many very beautiful minerals which are too soft to be suitable for mounting and use as a personal ornament, although for sheer beauty they would be desirable. Other substances possess great durability, as the common black corundum, but lack beauty or rarity and so are not valuable.

Beauty

The beauty of a stone depends upon its color, luster, and transparency or opaqueness.

Color

Color is due to the property of reflecting light. A ray of white light is composed of six pure colors — red, orange, yellow, green, blue, and violet. The sparkling diamond *reflects all* the light and therefore appears white, while jet *absorbs all* the light and appears black. The blue sapphire reflects only the blue rays, absorbing the red, orange, yellow, green, and violet. The emerald reflects the green, absorbing the others and so on.

These differences in regard to the reflection of light are caused by differences in the chemical composition of stones. The presence of cobalt produces blue, copper green, iron brown, manganese purple, etc. The glass maker uses the same method in manufacturing colored glass ware, putting these chemicals into "the batch" from which glass is made.

When it comes to identifying stones it is unsafe to place too much reliance on the color, for not only are there many stones of very similar colors, but one mineral may appear in many colors. An expert can usually distinguish the differences, but for most people color is not a reliable test.

Luster

Beauty in a stone is also dependent on its luster or brilliancy, that is, its manner of reflecting the light.

The kinds of luster are described as:

Adamantine, as in the diamond.
Vitreous, or glassy, as in the amethyst.
Greasy, or waxy, as in the turquoise.
Resinous, as in amber or garnets.
Silky, as in crocidolite.
Pearly, as in the pearl and sometimes the opal.
Metallic, or the luster of metals.

The degree of luster is described as:

Splendent, as in the diamond.
Shining.
Glistening.
Glimmering.

The diamond possesses the highest and rarest luster which a gem may possess, the adamantine luster in the splendent degree. At the present time stones with a high luster are the most popular. Vitreous luster is a little more subdued than the adamantine. The finest rubies have the adamantine luster, but more often they have the vitreous. The luster is brought out by the manner of cutting and polishing as well as by the setting or mounting of the stone.

Transparency or Opaqueness

Another property upon which beauty depends is the transparency or opaqueness of a stone. Scientifically this is known as "diaphaneity," the degree to which a gem transmits light. A gem is known as transparent, like the diamond, when objects can be seen through it; subtransparent, when they are seen a little less distinctly; translucent, as the opal, when objects cannot be seen through it but when the light passes through; subtranslucent, when this is true to a greater degree; and opaque, as the turquoise, when no light is transmitted.

Durability

The durability of a stone depends upon its ability to endure wear and friction. A scale, known as the Mohs Table, was devised by a man named Mohs to indicate the relative degrees of hardness of the various gems. It is as follows:

10. Diamond
9. Corundum (ruby and sapphire)
8. Topaz
7. Quartz
6. Feldspar
5. Apatite
4. Fluorite
3. Calcite
2. Gypsum
1. Talc

The gems which do not appear on this list range between the others; for example, the emerald and aquamarine 7.75, turquoise 6, opal 5.5, etc. There is considerable variation in each degree, however, as stones from different localities often vary greatly in hardness.

Stones below the number 5 are generally considered too soft for jewelry.

Rarity

All precious stones are rare. This is the reason they are so valuable. If diamonds were as common as coal they would be as cheap. But some stones are rarer than others. A stone may be rare in color, as the red diamond; or rare in size, as large emeralds.

This quality of a stone is the only one of the three essentials which is relative, as it varies with new discoveries of gem deposits. The crocidolite (tiger's

eye) is an example of this. Years ago it was used in fine jewelry and sold by the carat. Today it is so plentiful that it is used only for cameos and intaglios.

The other two essentials, beauty and durability, are constant, as they depend upon the chemical and physical composition and structure of the stone.

Chapter VIII

DESCRIPTIONS OF STONES

The Diamond — Its Characteristics

The diamond is generally regarded as the prince of gems.

In composition the diamond is the same substance as coal, lampblack, and graphite; that is, pure carbon but in its crystalline form.

In color the diamond may be perfectly transparent or in shades of yellow, brown, green, gray, red, blue, or black. For example, the famous Florentine diamond is light yellow, the Tiffany deep orange, the Hope diamond blue, one owned by the Czar of Russia a brilliant red, and a pear-shaped one in the Dresden vaults a bright green. The blue-white diamonds having a distinct bluish tint, are the finest, the white, colorless diamonds are next, and those with a yellowish cast, or "off color" stones, least valuable. Diamonds are usually transparent, though the gray or black diamonds known as bort or carbonado (which are used for drills, etc.) are opaque.

The luster of diamonds is much higher than that of other minerals. Zircon comes next. All grades of luster are found in the diamond, from the adamantine in the splendent degree, as in the A 1 brilliant, to the greasy and dull. A metallic luster is often seen in stones worn by water.

In hardness the diamond exceeds all other known substances. It is the most brilliant of all stones. The wonderful brilliancy of the diamond is due mainly to the total reflection of light from its various invisible facets. It not only reflects light from the external facets, but from the tiny internal ones. Its flashes of light are due to the property of dispersing or separating light into its different colored rays.

In size, diamonds range from the size of a grain of wheat to a few as large as a walnut, and one as large as a man's fist.

Sources of Diamonds

For a long time all the diamonds came from India, from the rivers not far from the town of Golconda, and from Borneo. In 1727 they were discovered in Brazil, which for 140 years was the chief diamond field of the world. They are still mined there. In 1829 they were discovered in Europe, and in 1850 in California. Idaho, Oregon, and Wisconsin also have some diamond producing fields. In 1851 diamonds were discovered

in Australia, but these have never been very large, those weighing 5⅝ carats being the largest.

It was not until 1867 that the field which produces nine-tenths of the world's supply today, South Africa, was discovered. The first diamonds were found by accident in a river bed near Hope Town in Cape Colony. Among the most famous and most productive South African mines are those at Kimberley and Jagersfontein.

Diamonds are often discovered associated with quartz, garnets, sapphires, topazes, tourmalines, and zircon, whether in river beds or in mines. When the diamonds are in the gravel of river beds, barrowfuls of the sand are searched much as gold is "panned." When they are found in mines they are worked by shafts sunk in beds of deposit, as in the Kimberley claims. Some mines are already 2,000 feet deep.

Mining of Diamonds

The modern method of recovering rough diamonds from the soil in which they have lain for ages is interesting, and it accounts in no small measure for their ever increasing value. The rock containing the clay and diamonds is blasted and carried to the weathering grounds, where it is spread out in the open air to disintegrate. From six months to one year is required to pulverize the earth thoroughly and to get it

ready for the washing machines. These machines separate the diamonds and other heavy material from the earth. This material is then sifted into sizes, and finally it goes to the sorting tables. After sorting, it is cleaned by boiling in acids. After this the stones are carefully sorted according to size, color, and purity, and made up in parcels to be sent to the syndicates' offices, where they are sold to the cutters and exporters.

Value of Diamonds

The quality of a diamond is described by the terms "first water," "second water," "third water," and "fancy stones." The term "water" is used because when a perfect diamond is submerged in water it is invisible.

A first water stone is perfect.

A second water stone has some slight imperfection, being flawless but tinged with color, or colorless with a slight flaw.

A third water stone has marked flaws or imperfections or a noticeable color.

Fancy stones are those which have a distinct and beautiful color.

White diamonds are wholly free from color, that is, clear like a dewdrop.

History of Diamonds

In early times, the diamond like other gems was

considered a charm against disease and evil spirits, and was closely connected with the art of medicine. Later on, diamonds were worn only by kings in their magnificence. They were worn for the first time as personal adornments in the fifteenth century by French women. Today they hold an important place among the world's commodities of beauty and luxury. The Russian crown jewels contain some of the famous diamonds of the world, and the Imperial Treasury of Austria has the Florentine diamond worth about $500,000. The crown worn by Queen Victoria was of velvet with an ermine border, covered with diamonds, pearls, sapphires, and emeralds, set in gold and silver. It contained more than 2,000 diamonds and 277 pearls.

The origin of the use of diamonds in betrothal rings was probably due to the fact that for many centuries they were supposed to have a strong spiritual influence, being symbolic of constancy and innocence.

Many people purchase diamonds as an investment. In the past ten years the price of the highest grade diamonds has tripled. Before the European War there was a yearly increase in the price of fine stones and diamonds were among the commodities whose value was greatly increased as a result of the war.

The Emerald

The true emerald is the green form of the mineral

beryl, although the name emerald has recently been used to designate various green stones, such as the Brazilian tourmaline, olivine, garnet, etc. The true emerald is worth as much as a ruby and more than a diamond. The reason for this high value is that green stones are greatly in demand, and that perfect stones are scarce as many emeralds contain small cracks and foreign matter which make them dull. Large stones are very rare and therefore very expensive. One of the largest known to exist is owned by the Duke of Devonshire; it measures two inches across and weighs 8 9/10 ounces.

The chief sources of supply of this gem at present are South America and Siberia. Emeralds are never found in gravel like diamonds, rubies, and sapphires, but are always embedded in rock formations.

The aquamarine has the same mineral composition as the emerald. It takes its name from the color of the sea. It is not so rare as the emerald nor so much in demand.

The word beryl is usually applied to stones of golden yellow or other colors which have the same composition as the emerald or aquamarine.

Pearls

Pearls are very unlike other gems in origin as they are found in the shells of oysters and other shell-fish.

They are divided into two classes: (1) oriental or true, and (2) fresh water pearls. Other pearls may be similar formations produced by mollusks, but from material that is not pearly.

Structure of Pearls

The structure of a pearl resembles that of an onion. Layers of calcium carbonate and other matter, extracted from the water by the pearl oyster or pearl mussel, are deposited about some foreign substance, like a grain of sand, which has lodged itself within the shell and irritates the body of the oyster or mussel. A pearl may assume any shape: spherical the most prized, drop or pear-shaped, oval or egg-shaped, or it may be quite irregular in form. The word pearl itself means a pear-shaped ornament. Boutons, or button pearls, are frequently found attached to the shell from which they are cut. The bottom part is smoothed and polished. They lack luster on the side which was attached to the shell. Wart or blister pearls are the result of a parasite's being walled up at the point of entrance to the shell. Irregular and odd-shaped pearls are called baroques.

Color of Pearls

Ordinarily the color of pearls is a satiny silver or bluish-white, or a faintly tinged yellowish-white. More rarely they are salmon-pink, purple, reddish, or

blackish-gray. Perfect black pearls are valuable, but not so costly as the finest white. Pearls are translucent to a varying degree.

Luster of Pearls

What brilliancy is to the diamond, luster is to the pearl. This is known as "orient." The thinner the coatings of deposit are, the finer is the luster. As many as 87 layers are found in rare Indian oyster pearls.

Sources of Pearls

About seven-eighths of all pearls come from the Arabian coast of the Persian Gulf. Most of the others are found off the coasts of Australia, the Philippine Islands, and about Ceylon. Those from the Arabian coast are of excellent quality, but of a more yellowish cast than those from Ceylon, which are beautifully white and silvery. The black pearl is found in the Gulf of Mexico. The abalone pearl, usually occurring as a baroque, is found in the English Channel islands, and on the coasts of France, Japan, and California. Pink or conch pearls are found in the Bahamas.

Pearl Diving

Pearl fishers dive for the pearl oysters which are found embedded among coral reefs, sponges, and other

sea life, in limestone formations from 15 to 40 or even 150 feet below the surface of the water. Sometimes the oysters are on shoals, but always under the surface of the water.

The industry is financed by merchants who control the fishing. In the Red Sea district Arabs man the boats and black slaves do the diving. Several boats go out together and remain during the season, which may be three or four months. The diver, connected by a signaling line to the boat, is let down to the bottom and remains there for hours, gathering shells, which he brings up in his basket. These are counted and the next day the pearls are taken from the dead oysters and sorted by passing through brass sieves. They are then classified as to size, color, and quality and weighed and valued.

Size and Value of Pearls

Large pearls are sold separately. The smaller ones known as seed pearls come into the market bored and strung on silk in bunches. The unit of weight is the pearl grain (¼ carat). Spherical pearls command highest prices, the pearl drop the next, and the button the lowest. The cheaper grades are sold by the carat.

Single pearls often command great prices, but a perfectly matched pair is worth four or five times the price

of either taken singly. It is said that there are only four individual pearls that have a world-wide celebrity.

History of Pearls

The use and popularity of pearls extends back for centuries. Chinese records show that pearls were used as tribute in the twenty-third century B. C. They have always been associated with royalty and luxury, being counted among the principal treasures of kings. The pearl has been called the " aristocrat of gems."

Culture Pearls

Culture pearls are made by cementing small pieces of mother-of-pearl to the interior surface of the oyster shell. In about a year a coating of pearl is added which is doubled in another two years. This is removed from the oyster, cemented to a piece of ordinary mother-of-pearl and the lower part ground to the usual symmetrical shape. It makes a pearl similar to the real except that the orient is inferior. Blister pearls are treated in the same way, but also lack orient.

The Japanese carry on pearl oyster cultivation for the culture of these artificial pearls about the Island Tadoka. Women and girls do the diving.

Setting of Pearls

Pearls are not cut though, if dull, the first skin may be removed by a delicate operation and another

iridescent layer exposed. Because of their softness, pearls must be set carefully lest they be injured by the hard metal which holds them. When only the upper half shows they are often sawed in half. Button pearls are much used in rings.

Ruby

The ruby is the red form of the mineral corundum, and the most valuable member of the group. It ranks above the diamond in value, because large, perfect rubies are extremely rare. In color it varies from a rose to a deep carmine, the " pigeon's blood " hue being the most valuable. There is a legend that the expert's test for the color of a ruby is to put the gem on a sheet of white paper and let a fresh drop of blood from a pigeon's heart fall beside it. This explains the name of the shade. The color varies greatly with the direction from which the stone is viewed. Therefore in cutting, the side from which the richest color is seen is always uppermost.

Burma and India contain the most important ruby mines. Other mines are located in Siam, Ceylon, Afghanistan, and in the United States in North Carolina.

Some rubies show a six-rayed star and are called " asteriated " or star ruby, sometimes " cat's eye ruby." They are quite rare.

Inferior stones and imitations are very often offered for rubies because the stone is so valuable. The most common substitutes are the red spinel and garnet. Optical tests readily detect the difference.

Common faults of rubies are a lack of clearness, or a presence of cloudiness, called silk, patches, and internal cracks.

Sapphire

The sapphire is the same mineral as the ruby, namely corundum, but is the blue form. All shades and depths of blue are found, but the most highly prized colors are the cornflower and royal blues. The deep colored stones are known as lynx or cat sapphires, and the paler shades as feminine. The color usually grows pale under artificial light but some specimens become violet and these are very valuable. Like the ruby, some sapphires show a six-rayed star in certain kinds of light. If the rays are bright and the star well defined the stone is very valuable.

The sapphire is the hardest form of corundum. In value it is approximately two-fifths that of the ruby, but as sapphires of large size are more plentiful than large rubies, the value does not increase so rapidly with size. They often have to be cut down considerably as they are frequently patchy in color.

Sapphires are found in the same localities as rubies, usually with them. More than half of the world's supply comes from Siam; the rest from Ceylon, the Himalaya Mountains, Australia, and the state of Montana.

Amethyst

The amethyst is a purple variety of transparent, crystal quartz, ranging in color from the slightest violet tint to a very dark plum color. It is found chiefly in Brazil, the Ural Mountains, and Siberia, but also in a number of other localities, North America, the British Isles, Uruguay, and Ceylon. The Siberian stones are the finest. The word amethyst means "preventing drunkenness," and the stone was supposed to keep its wearer from this vice.

At one time the amethyst was quite rare and very valuable, but because of the recent discoveries of large deposits it is not nearly so valuable today. Its beautiful color and ability to harmonize with a costume scheme make it a popular stone at all times. The amethyst is an appropriate stone for mourning wear. It should be simply mounted for this use.

A good amethyst should be a uniform deep reddish-purple color, and perfectly transparent. This shade will hold its color under artificial light, while the paler ones do not. Amethysts mounted in dull silver are beautiful for wear with pearl-gray fabrics.

Chapter IX

DESCRIPTIONS OF STONES (Continued)

Coral

Coral, like the pearl, is carbonate of lime. It is built up by the out-grown shells of minute sea animals, called zooids and is found 60 to 100 feet below the surface of the water, firmly attached to some object in the bottom of the ocean, such as a stone or bottle. It is found in many parts of the world, in low latitudes, but the gem coral comes almost exclusively from the Mediterreanean Sea and off the coasts of Africa, Corsica, and Sicily. Italy is the center of the coral industry, both fishing and working, including the carving and cutting of cameos.

In color the gem coral ranges from white and bright pink to a dark red. The wild-rose pink is the most desirable. The demand for coral has increased steadily in recent years.

Garnet

Garnet is the name of a class of gem minerals, rang-

Figure 1. Garnets in Matrix

Chapter IX

DESCRIPTIONS OF STONES (Continued)

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Figure 1. Garnets in Matrix

ing in color through red, pink, brown, yellow, and green.

The precious garnet, the cherry or blood-red variety, is known as almandine, from the name of the ancient city which first introduced them to Rome. These come from India, Australia, and Brazil. There has been an increasing demand for this variety of garnet for medium-priced jewelry in the last few years.

The garnet which is second in value is the very deep shade, ranging from a deep blood-red to almost black, is known as the Bohemian garnet, from the locality where it is found, or pyrope, meaning " fire-like." The other colors are known by a great variety of names. A beautiful, rich, green shade is known as " olivine."

Opal

The distinguishing feature of the opal is its beautiful play of colors. The term " opalescence " is used to describe the blending of the yellow light transmitted through the stone. It is not certain what causes the variety of colors. Some authorities believe that minute cavities cause a refraction of light. In the variety used as a gem stone, the precious opal, brilliant and pure greens, vivid crimsons, electric blues, rich violets, or sherry yellows appear. The best precious opals come from Hungary. They are also found in Honduras, Mexico, Wales, and Australia.

The fire opal is so called because of its reddish tint. It is particularly apt to deteriorate through exposure. The harlequin opal is another popular variety showing bright green and crimson flashes. Within recent years a black variety has become popular, and there are a great many other varieties.

Opal matrix is much used in artistic jewelry in which a rugged effect is desired, because of the great contrast between the stone and the rock in which it is found.

In earliest times the opal was considered an omen of good luck, but since the seventeenth century it has been superstitiously considered unlucky. Queen Victoria is believed to have been responsible for reinstating it in its present popularity by wearing it herself and presenting it to each of her daughters upon their marriage.

Topaz

Topaz is always thought of as being yellow, but it may be almost any color or quite colorless. It is not so popular today as in the past. The true topaz is very heavy, 3½ times as heavy as water, and can always be detected by any one accustomed to handling stones. It is also very hard, being the third in the scale of hardness. Therefore, it can be highly polished, and the colorless topaz has sometimes been mistaken for a diamond.

Other minerals known as topaz are the yellow sapphire, called "oriental topaz," and the varieties of quartz called "saxon," "Scotch," "Spanish," "smoky," and "false."

Brazil is the chief source of supply, but it is also found in Saxony, Mexico, and the United States.

Turquoise

The turquoise is the most popular of the opaque stones. It is found in the light shades of blue, the characteristic color being a greenish, azure, or robin's egg blue. The color is due to a compound of copper which it contains. It has a waxy luster showing a beautiful play of light. Turquoises retain their color well at night.

Persia has for centuries been the source of supply for turquoises, but in recent years the supply has greatly diminished and today stones come from New Mexico, Arizona, and many other localities. History is full of the legends surrounding this stone. It was closely connected with social and religious rites and ceremonies. It is said that its name is due to its being brought into Europe through Turkey.

The value of this stone rises rapidly with increase of weight on account of the difficulty of obtaining large perfect pieces.

Turquoise matrix is somewhat popular at present.

The dark brown matrix is preferred as the mottling of the brown and blue gives a very rich effect.

Cat's Eye

There are many different stones in the market called cat's eye, any stone having a changeable, undulating luster, like the eye of a cat in the dark being given this name. The true stone is very valuable.

The distinctive feature of the stone is the milky-white, bluish, or greenish-white sheen which crosses it at every movement. This is due to a streak of closely packed asbestos fibers contained in the stone. These fibers reflect the light. The effect of the streak is greatly influenced by the skill of the cutter. The greater the curvature of the stone, the better the effect. The best cat's eyes come from India and Ceylon.

The quartz cat's eye exhibits the same ray of light, but is far less beautiful. It is greenish-gray in color. The tiger's eye is also quartz and resembles the cat's eye. It is not much in demand at present, but about twenty-five years ago was much used for carving cameos. In color it is yellow, ranging to blue, green, or red. The blue variety is known as hawk's eye.

Chrysoprase

Chrysoprase was at one time a very fashionable stone, then its use died out, but in recent years it has

again come somewhat into favor. It is the apple-green variety of quartz, obtaining its color from nickel. Moderate heat or strong light destroys the color. It is found in India.

Jade

Jade is a sage-green or green-and-white stone particularly valued by the Chinese, who use it lavishly for ornamental purposes. In jewelry it is seen in bracelets and seal rings and it is set in silver chains. It is not the beauty of the mineral that interests people so much as the wonderful workmanship displayed by the Chinese.

The best variety comes from Burma and New Zealand.

Moonstone

The moonstone is a very beautiful form of feldspar, reflecting a soft, bluish-white light in an opalescent manner. It is found chiefly in Ceylon, but also in several localities in North America. Colorless translucent pebbles found on one of the beaches in California, and sometimes called moonstones, are often gathered by tourists for cutting and mounting in scarf-pins and cuff buttons, but these are not the true moonstones.

Moonstone is usually cut so that the light takes the form of a more or less well-marked band. Lucky

charms of moonstone are often sold in ball forms, as the moonstone is popularly considered a lucky stone.

Peridot

Peridot is found in a variety of colors, but it is only regarded as a gem when it is of rich olive-green color, resembling that seen on looking through a delicate translucent leaf, and when it is perfectly transparent. It is sometimes called " the evening emerald." When it is a bright yellowish-emerald green tint it is called " olivine," although green garnets are also known as " olivines."

Peridots come from Burma, Ceylon, Egypt, and Brazil. As they are moderate in price and effective, they are quite popular, but being soft they are not adapted to settings where they would receive hard usage as in rings.

An interesting variety of peridot is Job's tears, which are found in separate pear-shaped globules.

Kunzite

Kunzite is lilac-colored, varying from a deep rosy shade to delicate pink. It is a comparatively new gem, having been discovered in California in 1903, and named for the mineralogist, Dr. Kunz, an American authority on gems. At present the supply of this gem does not nearly equal the demand.

Tourmaline

Tourmaline is found in a great variety of colors. The shades which are most used for stones are green, pink, red, and blue. The green variety is the most beautiful of all green stones, the medium bright green shade being considered better than the brighter or more blackish-green. The deep blue shade is known as the " Brazilian sapphire," and the dark red " rubellite." It is so like the ruby that it easily deceives any one but an expert. In fact, the varieties of tourmaline show a strong resemblance to other stones such as the sapphire, the ruby, and so on, though they are easily distinguished by scientific tests. The stones are likely to show flaws or " feathers " especially the pink shades.

Tourmalines are found in a great many different localities in the United States, but the principal sources are Ceylon, Burma, Brazil, and the Ural Mountains.

Amber

Amber, like the pearl and coral, is a product of the sea, but of vegetable origin. It is the fossil resin gum of extinct pine trees buried in the ocean beds of the Baltic and Adriatic Seas, and off the coasts of Sicily, France, China, and India, and in the states of New Jersey and Maryland. The chief source of supply is the Baltic coast where it is cast up by the waves. It is also dredged for in the sands of shallows.

In color it is yellow, sometimes reddish, purplish or brownish, brittle and both transparent and translucent. A mottled variety is called demi-amber. Amber takes a brilliant polish and is soft enough to be easily worked. It produces electricity when rubbed. In fact the word electricity is derived from the Greek word, *elektron,* meaning amber, because of this characteristic.

Amber is mentioned by Homer and another ancient writer says that it was stained to imitate precious stones. The Romans used amber for all kinds of ornaments.

It is much used for beads, for necklaces, mouthpieces for pipes and cigarette-holders, cane knobs, and so on. It is very durable and is imitated in celluloid.

Bloodstone

Bloodstone is a form of opaque, dark green quartz containing small red spots. The best qualities show bright spots on a uniform ground. It is not extensively used in jewelry now, except in signet rings, where it is used because it can be carved easily.

Agate

All agates are varieties of quartz. The name agate usually describes the variety which contains parallels of different colors, spots, or patches. It is variously known as banded, ribbon, or ring agate, according to the formation of the lines. Agate in general is little

used in modern jewelry, although it is much in demand for art objects and interior architectural decorations. The center of the industry of cutting and polishing agates has been located at Oberstein, Germany, for centuries.

The moss agate, however, is in vogue for jewelry at the present time. This agate contains, instead of parallel bands, particles of iron giving it the appearance of a variety of vegetable growth. The finest specimens come from India and many beautiful ones are found in the Rocky Mountains of the United States. These are cut and mounted for sale to tourists as souvenirs.

Lapis Lazuli

Lapis lazuli, or azure stone, is given a place among precious stones because of its beautiful blue color. It is frequently mottled with white spots and specks of iron. The finest variety, found in Russia, has a clean or very slightly spotted dark blue surface. Another variety, found in Chile, is lighter and mottled with white quartz. Lapis lazuli is also found in India and Burma. The stone is in great demand at present.

Amazonite

This is a bluish-green opaque feldspar. It is found in Siberia and Scotland and Pike's Peak, Colorado; and is used in scarf-pins and cuff buttons.

Azurite

Azurite is a most beautiful, opaque, blue stone, whose color is due to the presence of copper. As it is soft, however, its use for gem purposes is limited.

Cairngorm

Cairngorm is a brown variety of crystal quartz, also called " smoky topaz." Its rich dark color makes it much desired for jewelry.

Carnelian

Carnelian is a form of quartz, so called on account of its flesh color. When found, however, it is usually very dark, sometimes almost black or greenish. On heating it becomes red and translucent.

Carnelian is used as a substance upon which to carve devices for signets. It is used for the purpose because of its uniformity of color and because sealing wax does not adhere to the stone.

Labradorite

Labradorite is so called because it was first found in Labrador. It has bright splashes of blue which show when turned to the light but otherwise it has a dull gray or brownish appearance.

Malachite

Malachite is a carbonate of copper, an opaque stone

appearing in layers and patches of green. It has a silky luster and takes a high polish. When intermingled with azurite it forms beautiful peacock colors and is then called malachite-azurite.

Marcasite

Marcasite is often called " fool's gold " because it is frequently mistaken by the uninformed for gold. It has little value, but is used in rings, brooches, and scarf-pins.

Rhodonite

Rhodonite is opaque or translucent, and in color pink or flesh color. It sometimes has black markings. It occurs in large pieces making it suitable for cutting jewel boxes, paper weights, etc. It also makes a very beautiful stone for cuff-links, scarf-pins, and artistic jewelry.

Smithsonite

Smithsonite is a translucent mineral, apple-green or sky-blue in color, named for the founder of Smithsonian Institution in Washington, D. C. A striped variety found in Greece makes a striking gem for scarf-pins. As it is rather soft it is not much used in other ways.

Spinel

Spinel is a beautiful transparent gem found in many colors, but the flame-red is best known.

Zircon

Zircon is found in a variety of colors, brown predominating. The white stones, called jargoon, are sometimes mistaken for diamonds. It ranks second to the diamond in brilliancy and also has the adamantine luster. It is the heaviest of all gems. Zircons come chiefly from Ceylon.

Chapter X

ARTIFICIAL AND IMITATION STONES

Difference

There is a wide difference between artificial and imitation stones. Artificial stones are identical in composition with the natural stones, but they are made in the laboratory instead of by nature. The ruby and the sapphire are the stones successfully made in this way, and these are used in high-grade jewelry.

Imitation stones, on the other hand, are used in cheap jewelry, and are only glass, or "paste" reproductions.

Synthetic Stones

Rubies and sapphires are made in the laboratory from the same chemical elements which enter into the composition of the genuine stone. A compound of aluminum, with the correct coloring matter, oxide of chromium for rubies, titanic acid for sapphires, is allowed to trickle through a hole into the flame of the oxy-hydrogen blow pipe, which reaches a temperature of 1800° C. The mass fuses. It is then gradually

cooled. The resulting stone has all the properties of a genuine stone except the inner crystallization and therefore the synthetic stones lack the " fire " of real stones.

Chemists for years sought a practical method for duplicating nature's work. The conditions necessary are extreme heat and high pressure, and it was not until the invention of the electric furnace and the oxy-hydrogen blow pipe that sufficiently high temperatures could be produced. The originator of the practical method now used was A. Veneuil, a Frenchman.

Reconstructed Stones

The term reconstructed has been erroneously applied to synthetic stones. A true reconstructed stone is formed from tiny fragments of genuine stones, fused at a very high temperature into a single stone. At the present time, however, there are no true reconstructed rubies or sapphires on the market.

" Faked " Real Stones

Inferior, real stones which have been altered and improved in color by heating or by treatment with chemicals are also seen among good jewelry.

For example, Brazilian topazes, when heated become a beautiful rose-red color. Sapphires lose their color in burning. Off-color diamonds have been passed as " first water " stones by dyeing them with a magenta varnish, which neutralizes the yellowish color. This

wears off in time and the true color is exposed. A suspected diamond can be soaked in alcohol. This removes the varnish, if any is present, and shows the real color.

Imitation Stones

The process of making glass imitation, or " strasse " stones, is similar to the manufacture of any glass. A mixture of powdered quartz, potassium carbonate, and lead to give brilliance gives a fairly good imitation. Rhinestones are made in this way. Definite proportions of coloring matter are added if colored stones are to be made. (See manual on glass and glassware.)

Coloring of Imitation Stones

To obtain the correctly colored imitations for the ruby, amethyst, etc., traces of metallic oxides are used. The proportions for the most commonly used imitations are:

Imitation ruby	— 1,000	parts	glass
	40	"	oxide of antimony
	1	part	purple of cassius
	1	"	gold
" sapphire	— 1,000	parts	glass
	25	"	oxide of cobalt
" emerald	— 1,000	parts	glass
	8	"	copper oxide
	.2	"	chromium oxide

Imitation amethyst — 1,000 parts glass
25 " oxide of cobalt
trace of oxide of manganese

" garnet — 1,000 parts glass
trace of purple of cassius

" turquoise — 1,000 parts glass (opaque white)
trace of copper oxide or oxide of cobalt

The mixture is heated for about thirty hours in a crucible; the heat is then gradually lowered and the melted glass solidifies.

The stones are cut and polished in the same way as the real stones, although the process is simpler as the glass is not so hard.

The chief difficulty encountered in the manufacture of imitation stones is obtaining a sufficiently hard glass to withstand the knocks and hard usage which a real stone will bear. A very hard glass *can* be obtained but it is not brilliant. The harder the glass the less brilliant the stone.

Test for Imitation Stones

The test for glass imitations depends on this lack of hardness, for a piece of flint will easily scratch the hardest paste known, but it has no effect on the ruby, sapphire, and other genuine stones.

Imitation Pearls

Imitation pearls may be perfectly made and have the

advantage of being more durable than real pearls.

Small spheres of glass, or beads, are coated internally with a preparation of fish scales. (It may be of interest to know that 4,000 fish are required to make one-quarter of a pound of "pearl essence.") The beads are then coated both externally and internally with pearl essence, and filled in with wax. They are exceedingly beautiful and have a rich luster, but lack the concentric layer effect of the true pearl.

Imitation Coral

Imitation coral is made from red gypsum or celluloid.

Imitation Amber

Amber is imitated also in celluloid.

Imitation Cameos

Imitation cameos may be made by putting glass or "strasse" into a mold of the raised portion, and melting it. After cooling, the cast glass is trimmed and cemented on a background of real stone. These imitations can be detected by placing them in hot water, which dissolves the cement and the front separates from the back.

History of Imitation Stones

The art of imitating precious stones has been practiced for centuries.

In the tombs of upper Egypt pastes dating back to 2000 B. C. have been found. Even at this early time this ancient country was in a high state of civilization and one of their most profitable and scientific trades was imitating all manner of precious stones.

Later on the Greeks, Etruscans, and Romans made them. An ancient Roman historian, Seneca, mentions a process of making emeralds by giving a green color to rock crystal. The famous table of Solomon taken from the Temple by Vespasian, the Roman conqueror, was studded with imitations. Many of the famous gems of antiquity were merely of glass.

In our own times the manufacture of false stones has become a thriving industry.

Part III—Manufacture of Jewelry

Chapter XI

METAL WORKING

The Goldsmith an Artist

Because of the precious materials from which jewelry is made and the fact that jewelry is made for ornament rather than for practical use, the workman has an interest like that of the artist in creating and developing beautiful forms and combinations.

Some of the great sculptors and painters of Italy had their early training in the goldsmith's shop and the goldsmith was given a place of honor and respect among all craftsmen.

The goldsmith required in his workshop many kinds of appliances, including:

A lamp for melting and annealing the metal.
Blow pipes for controlling and directing the flame.
Charcoal blocks upon which small quantities of metal might be melted.

Crucibles or melting pans for melting larger quantities and for making alloys.
Draw plates for drawing out wire.
A draw bench in which the draw plates were held when necessary.
Pitch blocks upon which sheets of metal were placed for repoussé work.
Stakes or small anvils either flat or rounded upon which the metal was hammered and shaped.
A sand bag.
Molds for casting.
A doming block for making hollow balls.
Acid for making the "pickle" in which the metal was placed in order to remove the film which collected on its surface when it was annealed.
Sand, wax, borax, solder, binding wire, and wire gauges, and a work bench with pans or leather pockets beneath it to catch the tiny particles of metal from filings.

Enameling required:

Mortars and pestles for grinding colors.
Metallic oxides and enamel materials, lead, sheet-iron, aluminum, ground glass, burnishers, etc.
A muffle furnace for firing.

The tools used for delicate work included:
Hammers and mallets of steel and horn.

Gravers, chisels, and punches for chasing and repoussé work.
Files of many kinds including a set of "needle files."
Shears and piercing saws for cutting the metal.
Pliers, nippers, and vises for holding and bending the pieces.
Mandrels or steel rods upon which wire was coiled and rings shaped.

Making of Jewelry

Much of the most artistic jewelry was "built up" from tiny grains or wires or shaped pieces soldered together instead of being cut out of a sheet or block of metal. The designs were in open filigree work or backed with a foundation of solid metal.

Grains and Grain Clusters

When gold or silver is melted on a charcoal block the metal does not spread out in a thin sheet but gathers itself into tiny globules or grains. If the block has small hollows in it these grains will be of uniform or graded sizes.

Many beautiful designs were made of clustered grains soldered together but they were usually combined with wire which was made by a process called "drawing."

Wire Drawing

If one end of a strip of soft metal is held firmly and the other end pulled with a certain force it will "draw" or lengthen out. The draw plates used for drawing wire were simply steel plates with holes of graduated sizes.

Wire drawing was one of the most important branches of the jeweler's work. The bar or strip of metal was first hammered at one end until it had a tapering point which fitted into one of the holes of the draw plate. It was then grasped with a pair of pliers and pulled through the hole. It came out thinner and longer. Then it was pulled through the next smaller hole in the same way until the wire was the required size. The coarser wire from short pieces of metal could be drawn by hand but fine wire had to be drawn with the draw bench.

The holes of the draw plate were not always round. They might be oblong, square, or triangular, producing different kinds of wire. Hollow tubing was made by shaping the end of a flat piece of metal around a tapering mandrel so that it would fit one of the holes in the draw plate. It was then drawn out in the same way as the solid metal.

Annealing

As the wire became thinner, the metal hardened and

became brittle and had to be annealed or softened. This was accomplished by heating it to a temperature below the melting point and cooling it slowly. All jewelers had at hand a jeweler's spirit lamp and a blow pipe for this purpose.

The blow pipe was used for increasing and directing the flame of the lamp. A blow pipe is a metal tube through which a stream of air may be forced in order to supply additional oxygen to a flame and thus make it hotter. The heat was regulated by increasing and diminishing the pressure. The mouth blow pipe was simply a brass tube tapered to a fine point at one end, and the flame was controlled by the breath. Other pipes had the air forced in by a bellows which was operated with the foot.

Wire Jewelry

When drawn to the required size, gold or silver wire may be twisted, plaited, or cut into small pieces which may then be bent into fancy shapes and hammered into leaves or other delicate designs. One of the methods of securing pieces of convenient size and shape was the winding of wire closely around a small rod called a mandrel.

Wire which has been coiled around a mandrel looks like a spiral spring. When the coils are cut apart they form small rings open on one side. Some rings were

made only to be melted into grains as this was the best way of insuring that the grains would be exactly the same size. They were also used to form chains or flat decorations, being soldered together with gold solder. Rings of a larger size were bent separately with pliers, and after being soldered together, were shaped on a triblet or tapering mandrel. Gold solder is made of gold alloyed with copper and silver. The alloy melts at a lower temperature than the pure gold and therefore can be applied without injury to gold ornaments.

Beaded Wire

Beaded wire was produced by pressure when the metal was soft. A quaint description of the way in which beaded wire was made is given by Theophilus, a monk of the eleventh century:

" There is an iron instrument called the beading tool, which consists of two irons, one above and one below, the lower part is as broad and as thick as the middle finger and is somewhat thin.

" In it are two spikes by which it is fixed to wood below and out of the upper face rise two thick pegs which fit into the upper part of the iron and this upper iron is of the same size and length as the lower and is pierced with two holes, one at each end which receive the two pegs of the lower so that they can be joined together.

" They must be joined very closely with the file and in both faces thou wilt groove out several rows of little pits in such a way that when the irons are joined together a little hole may appear.

" In the large grooves place thou gold or silver rods beaten out long and smoothly round, and when the upper iron is smartly struck with the horn mallet while the gold or silver rod is turned around with the other hand, grains are formed as large as small beans, in the next grains as large as peas are formed, and in the third like lentils and so on smaller."

Repoussé Work

Jewelry which was not built up from grains and wires was either modeled from thin sheets of gold or cast in a mold. The first process is known as repoussé work. The thin sheet of gold was laid on a pitch block or other yielding material such as lead or soft wood, and the design was worked out slowly with hammers and punches from the back. In order that the metal might not be pierced or bent out of shape the modeling was done very carefully with rounded punches and light blows of the hammer repeated a great many times and occasionally the piece was removed from the block and worked down from the right side.

Casting

Casting is too complicated a process to describe with-

out a number of illustrations. It was done by melting the metal and pouring it into a mold made of plaster, sand, or clay.

A model of the article was first made of wax or clay. Plaster of paris, sand, or other material was pressed around it. Then the model was removed from this cast, and the melted metal poured into the space. If the figure was to be hollow a "core" was made like the model only smaller. The core was placed in the mold and the metal poured around it.

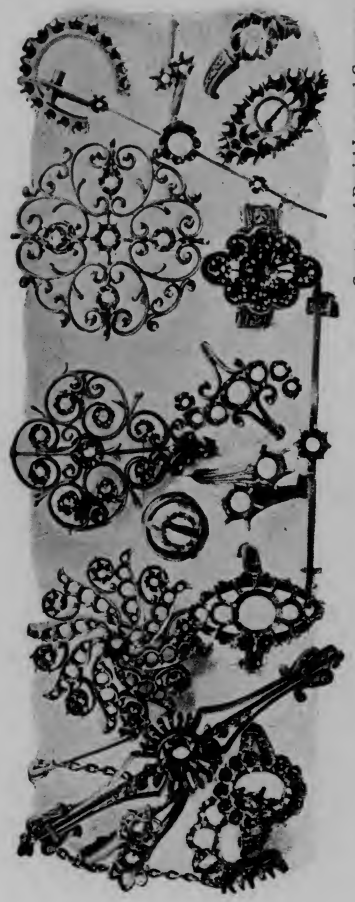
Very fine modeling was done by the "waste wax" process. The wax model in this case was not pressed into the sand but painted over with a number of thin coats of wet, finely powdered sand which were allowed to dry and harden. Then the wax was heated so that it melted and ran out, leaving a hollow shell of fine sand. When the metal had been poured into this shell and hardened the sand could be broken away.

After the figure had been taken from the mold it was modeled and finished by hand.

Silver jewelry was made by the same general process though silver is so much less valuable than gold that the work was not usually so delicate and finely finished.

Methods of Ornamenting

Chasing was done from the right side with graving tools of various kinds. All this work required an



Courtesy of Daniel Low and Company

Figure 2. Examples of Gold Mounts for Precious Stones

"eyeglass" or small microscope which fitted in the jeweler's eye and enabled him to see tiny flaws or irregularities in the pattern.

Damascening was the cutting of grooves in the metal and forcing into them wires or pieces of another metal.

Pierced work was done with tiny saws or drills, but, like carving, it was less used for gold than for silver or copper jewelry.

Modern Methods of Manufacture

Fine jewelry still requires many of the same tools and equipment for its manufacture as in the past, but great improvements have been made as the result of discoveries in chemistry concerning the treatment of metals and through improvements in machinery.

The jeweler's lamp has been replaced by the gas jet and the blow pipe has been greatly improved. Wire is now drawn by machinery and grains are obtained in large quantities in the various sizes needed.

The increasing use of platinum for fine jewelry has also modified the process as platinum may be hammered, drawn, or cut like gold and silver, but melts only at a very high temperature. No ordinary flame will affect platinum so that an oxygen torch must be used for melting or annealing it.

Designs for platinum jewelry are somewhat different in character from those suitable for gold. Much of this jewelry is pierced by means of fine drills and

studded with tiny stones. Diamond jewelry is now usually made of platinum incrusted with diamonds and set with larger stones where these are required by the design. Figures 2 and 3 show the differences between gold and platinum mounts for precious stones.

Though methods have been improved and some operations can be better performed by machinery than by hand those who wish distinctive jewelry wish to have it specially designed. In other cases the original is carefully wrought out and it is then duplicated by castings made in molds of cuttlefish bone.

Fashions come and go in jewelry as in other merchandise and the designer is always trying to create new ornaments which shall be exclusive as well as beautiful. The manufacturer is always trying to find ways of making these exclusive designs on a commercial scale. This can only be done by lessening the handwork and gaining similar effects by machine processes.

Commercial Jewelry

Nearly all the jewelry sold at a moderate price is now made in large factories by machines. Handwork is not entirely done away with, but the main processes are carried out by machinery which is very wonderful in its perfection and delicate construction.

The factory makes its own alloys, usually 10 karats

or 14 karats fine, from the pure gold which it receives from the government assayers. This alloy is cast into small bars, and then rolled into thin plates or drawn into wire or tubing by machinery.

Rings, brooches, and other solid articles are stamped out of thin plates by means of steel dies, operated by machines. Rings which are to have claw settings are cut in two pieces which are soldered together in the middle and are then rounded in another machine before having the settings soldered in place. In some cases a machine stamps the claws out of the plate composing the ring instead of having them made of a separate piece and soldered on.

Brooches and lavalieres are made in the same way, sometimes being cut in one piece, but more often made in several pieces which are put together by hand. A number of machines are usually required for the completion of each design. Chains are made by machines which turn the links and join them automatically. A long strip of chain or gallery is then put through another machine which can solder all the links in a section at once. When finished it is cut into the desired lengths and the clasps or fastenings put on.

Bracelets are cut from long flat pieces or from tubing and finished with clasps and hinges. The original designs for commercial jewelry are made with the greatest care and skill, and the machines used can fol-

low these designs exactly. One remarkable machine is able to copy a design in seven different sizes.

Sometimes the parts of rings, chains, brooches, or bracelets are sent from the factory in sets ready to be put together and finished in the jeweler's shop.

Cheap Jewelry

Gold jewelry may range in fineness from 22 karats which is found in old pieces, through 18, 16, to 14 karats, which is the accepted standard in America. Ten karat gold is made, but as more than half its weight is alloy it should not be called solid gold.

The luster of the cheaper alloys is dull and they may be affected by dampness.

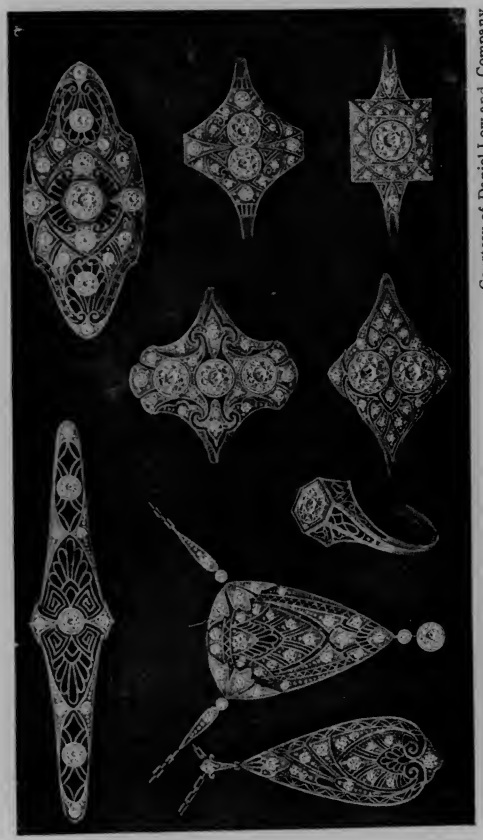
Gold-Filled Jewelry

For gold-filled jewelry a thin shell of gold is stamped with the pattern and this shell is backed by baser metal, after which the back is covered with an inferior quality of gold.

Seamless filled wire is made by covering a wire with gold and drawing it to the required fineness.

Rolled Gold

Rolled gold, or rolled plate is made of exceedingly thin sheets of gold made to unite by pressure with a sheet of composition. The plate is rolled until it may become the thousandth part of an inch in thickness, but



Courtesy of Daniel Low and Company

Figure 3. Platinum Jewelry Mounted with Stones from Pieces in Figure 2

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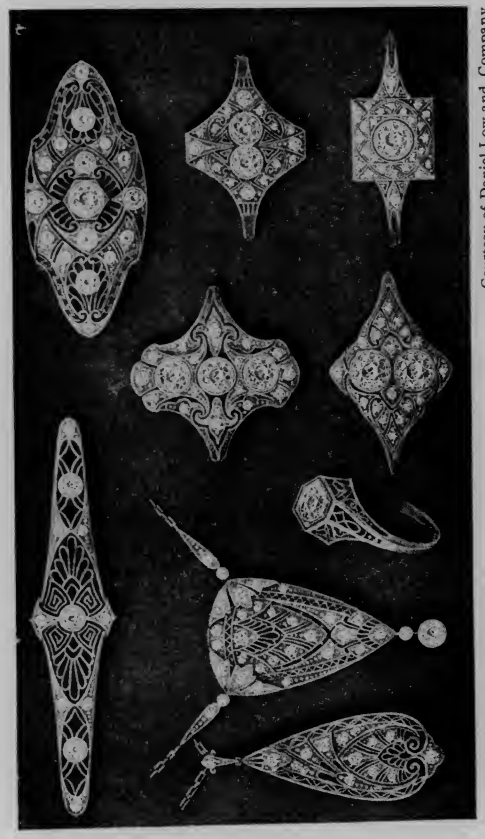


Courtesy of Daniel Low and Company

Figure 3. Platinum Jewelry Mounted with Stones from Pieces in Figure 2

even then it will not tarnish or be affected by acids if it is more than 14 karat gold. The plates are then annealed and polished on the gold side with rottenstone and oil.

Rolled gold may be of any quality or thickness. In Germany an official stamp is placed on the best rolled plate guaranteeing its quality and thickness; but in England the assay office does not recognize anything but solid gold and the United States is equally indifferent to the quality of rolled or filled gold. A revision of the stamping laws in the United States is now in progress and this defect will probably be remedied.

Electroplating

When we speak of gold-plated jewelry, we now mean articles which have been electroplated. This is a modern method of covering articles with a very thin coat of gold or silver by means of a current of electricity.

For gold plating an enameled iron saucepan can be used, with the articles to be plated attached to one pole of an electric battery and a piece of solid gold to the other. Then the saucepan is filled with a gold solution and placed over a gas burner or lamp. Manufacturers of gold plate have vats of enameled iron heated with Bunsen burners and containing from ten to thirty gallons of the gold solution.

The electric current acting on the sheet of gold transfers it through the liquid to the article to be plated until it is covered with a very thin coat of the precious metal. If the article is made of zinc, lead, or pewter, it must first be plated with copper and it must be absolutely clean. A strong coat is deposited in a few minutes. For a thick deposit the article must be taken out and brushed with scratch brushes to remove a brown film which collects on it. A frosted appearance is given by roughening the surface. The color depends on the temperature of the solution and the thickness of the deposit.

When taken out the articles are weighed to determine the quantity of the gold. They are rinsed in pure water and dried in sawdust. At this stage the surface is dull and must go through several polishing processes in which soft mops of swans-down, felt, or chamois are used to apply rouge and emery powder.

The process of silver-plating is similar except that the vats are larger, sometimes holding several hundred gallons. The articles to be silver-plated must be suspended by copper wire and the anodes of the battery attached to copper rods because silver is such a good conductor of electricity. Iron or steel must be copper-plated before receiving the coat of silver.

Tinting

The tinting of gold is a process by which the color

of gold is changed without changing its real character. It is done to produce artistic effects such as "dull gold." The article must first be absolutely clean, even the film left by the hand must be removed or the acids used will not act evenly on every part.

When the article has been carefully washed it is plunged in a hot bath of nitric acid to remove the silver or copper alloy from the surface; then alum, saltpeter, salt, nitrate of potash, hydrochloric acid, or other substances are used in solutions to give the desired effect. The objects to be colored are plunged into the hot solution. This process may be repeated a number of times till the right tint is secured; after which the articles are brushed and polished.

Roman gold is gold from which the luster has been removed by nitric acid.

Chapter XII

CUTTING OF PRECIOUS STONES

Importance

The cutting is the most important treatment given to the stone, the beauty of which depends to a large extent upon the skill and accuracy of the cutter.

Styles

There are two principal styles of gem cutting:

1. Faceted cutting, in which the surface of the stone consists of a large number of small, geometrical faces.
2. Cabochon cutting, in which the surface is smoothly curved.

Facet Cutting

The purpose of cutting gems with facets is to increase their sparkle, and therefore it is the transparent and semitransparent stones, such as the diamond, the ruby, the sapphire, etc., which are cut in this style.

There are three styles of facet cutting:

Brilliant
Rose
Step

Brilliant Cut

The brilliant cut is the most popular of all and is the one used for the most valuable stones, as the diamond, the ruby, the sapphire, the amethyst, etc.

In this style there are 58 facets altogether, 33 in the section known as the "crown," which lies above the "girdle," or greatest circumference of the stone, and 25 in the "culasse," the portion below the girdle. (See Figure 4.)

There are many modifications of the brilliant pattern, the finished form of the stone depending upon the character of the rough gem. However, certain proportions of size and arrangement of the facets are adhered to. For example, if a diamond is properly proportioned, after it is cut, the depth from the table or top plane down to a line with the girdle is just one-third of the entire depth. The table would take up one-third of the face, and each side running from the table to the girdle would also measure one-third of the face of the stone. These proportions affect the brilliancy of the diamond. For instance, a stone of good color, cut shallow with a large table, will have a brilliant edge, but the center will have what is known as a "fish eye" as the culet or bottom plane will be seen through the stone.

A colored stone is usually cut shallower than a colorless one, the deeper the color, the thinner the stone.

The half-brilliant cut is sometimes used in very thin stones. The lower part of the stone is a plane surface; the upper part is cut like the crown of the ordinary brilliant.

The brilliant cut was originated by a Venetian towards the end of the seventeenth century, and its discovery first brought out the true beauty of the diamond.

Rose Cut

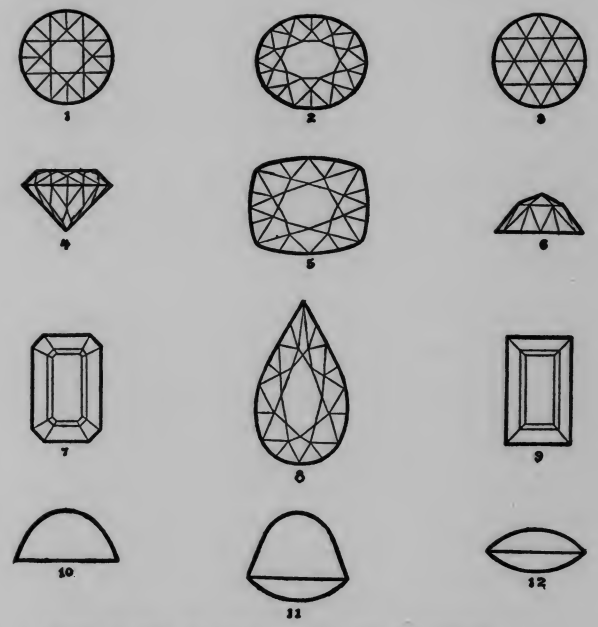
In the rose cut all the facets are nearly of a size and triangular in shape. The stone shines with a very mellow but subdued luster, as it has a flat base. This form of cutting was first used about 1655 and was one of the earlier ways of cutting diamonds. (See Figure 4.)

Sometimes a stone is double rose cut, the form of two rose cut stones joined together by their plane surfaces. This is called "briolette" or "rosette."

Step Cut

This style of cutting is so called because when viewed from the side the facets form a series of steps. The crown may have two or three steps, the culasse five or six or more. Step cut stones are usually square or six-sided. (See Figure 4.)

This form of cut is suitable for stones where a display of color is the chief consideration, rather than a brilliant play of light from the interior. If a light



1. Round Brilliant (top view)
2. Oval Brilliant (top view)
3. Rose Cut (top view)
4. Round Brilliant (side view)
5. Cushion Brilliant (top view)
6. Rose Cut (side view)
7. Step Cut (octagon)
8. Pear Brilliant (top view)
9. Step Cut (oblong)
10. Cabochon (side view)
11. High Cabochon (side view)
12. Lentil Shape (side view)

Figure 4. Styles of Cutting Precious Stones

(Courtesy of Espositer, Varni Company)

color is desired, the stone is cut shallow so that the light may easily penetrate; if a dark color is desired it is cut deep to secure a deep tone.

The stones most often cut in this form are the topaz, sapphire, ruby, emerald, garnet, peridot, and amethyst.

Curved Surface Cutting — Cabochon

In this style the upper surface of the stone is the shape of a low dome. The under surface is usually flat, although it sometimes follows the curve of the outer edge. (See Figure 4.)

It is used to bring out the natural color and luster of opaque and translucent stones; therefore such stones as the turquoise, garnet, lapis lazuli, carbuncle, cat's eye, star sapphire, etc., are usually cut cabochon.

Difficulties in Cutting Valuable Stones

The cutting of a valuable stone from the rough form is a highly skilled operation, and great delicacy of touch as well as judgment on the part of the cutter is required to produce the final treasure.

The cutter must carefully study the rough stone to determine how he can get the greatest beauty and value from it, and at the same time diminish it in size as little as possible. He must take into consideration the proportions of the stone. How exact these should be was described under the brilliant cut, in the case of the diamond.

Slitting

The first process is "slitting." The rough stone is held against a circular revolving plate made of thin metal on the edge of which there is diamond dust, which causes it to cut easily.

Faceting

For gems which are to be faceted, the principal facets are next outlined by a horizontally revolving wheel. The stone here takes on a definite form. Each gem is then cemented to the end of a wood holder, very much like the ordinary penholder. The faceting is then finished on other wheels.

Polishing

At the end of the faceting operations the gem is dull, colorless, and uninteresting. Its brilliance and color are brought out by the polishing process.

This is accomplished on a disk with some polishing material, such as rottenstone. This operation is also a very delicate one, as the angle or size of the facet must not be changed.

Loss of Size During Cutting

In the processes of cutting and polishing a large rough stone will lose 5 per cent or more of its weight, a small one 40 per cent.

Center of Diamond-Cutting Industry

Holland and Belgium have been the centers of the

diamond-cutting industry, but the United States has now established a number of factories with great technical perfection and more uniform standards than those in Europe. The center of the industry is New York City.

Diamond Cleaving

When the rough diamonds arrive at the factory they are weighed and the weight of each is recorded with its other characteristics in a book. Each stone is then examined closely in order to determine the direction of the planes of cleavage which can only be recognized by an expert.

The cleaver then cements the diamond to a wooden stick and with another diamond cuts a narrow groove in it at the exact place selected. A dull steel knife is inserted in this groove and a smart blow struck upon it. If this has been skilfully done the diamond divides at once and both surfaces are as smooth as if they had been polished.

This process requires the greatest care and skill on the part of the cleaver as any error would cause serious loss. If the groove is not exactly in the right place flaws are apt to appear when the stone is split thus greatly lessening its value.

Diamond Sawing

A new method has recently been introduced by which

stones may be sawed through the center and cleavage need not be considered. This gives much better results than cleaving though the former method is still used for large diamonds.

One-half of the stone to be sawed is embedded in a small metal receptacle filled with melted aluminum in a machine run by an individual electric motor. The edge of a circular bronze saw is set against the stone on the line selected and gradually cuts its way through. These saws are almost as thin as paper and are charged with a paste of diamond dust and olive oil. They make three thousand revolutions a minute.

The time required to saw a stone in half depends upon its size. A large diamond takes from three to four days. If the saw were not charged with diamond dust the stone would destroy it in a short time.

Cutting and Polishing Diamonds

The diamond is cemented to the center of a rotating cutting lathe and another diamond is cemented to a long stick. The operator presses the stone on the stick steadily against the stone in the lathe at the proper angle until the stone in the lathe becomes rounded and smooth. The other stone is then put in its place in the center of the lathe and their mutual action is reversed until both stones are shaped and ready for the cutting of the facets.

This work is done upon iron wheels called "skaifs"

which make twenty-two hundred revolutions per minute. The diamond powder produced at the cutting is the only material used for polishing. It is applied with olive oil forming a paste which the polisher uses on his wheel. The utmost skill and watchfulness are necessary as the angles of the facets must be mathematically exact in order to secure the greatest brilliancy. Sometimes a gauge is used and each facet measured.

The smooth surface made by the saw becomes the table of the diamond which the polisher first cuts on four sides and then divides each section in half, making eight equal surfaces extending to the girdle. The number of facets cut from the girdle to the culet exactly corresponds to the ones above.

This accomplished, the stone is ready for its "brillandeening," or making the small facets. Eight star facets are cut close to the table and sixteen small facets run from the stars to the girdle while sixteen small facets are cut from the girdle down to the culet.

The perfectly cut diamond should have fifty-eight facets. Above the girdle there are eight division facets, eight star facets, sixteen small facets, and one table, thirty-three in all; below the girdle there are eight division facets, sixteen small facets, and one culet, twenty-five in all; making a total of fifty-eight in the finished diamond. (See Figure 4.)

During this process the stone is imbedded in a ball of

hot lead from which it must be taken out and reinserted eight times.

By modern American methods the loss in cutting and polishing has been greatly reduced by scientific methods, but the demand for perfect stones is greater than in Europe, making the quality assured but increasing the price.

Diamond cutting is one of the most highly skilled of all occupations. The workmen require five years' apprenticeship before they are qualified to take positions as skilled artizans.

Cabochon Cutting

In cutting stones cabochon the operator keeps the handle on which the gem is mounted in constant motion so as to give a smoothly rounded form.

Special Cuts

In addition to these two principal groups of cuts there are special forms of cutting such as:

Cameo	Monogram
Intaglio	Scarab
Crest	

Cameos

During the last few seasons the fashion for cameos has been revived, and they are at present very popular.

A satisfactory definition of the word cameo is not easy to give because it may be applied to so large a

group of carved materials, and yet does not include all.

One writer, Percivale, defines a cameo as "A carving in relief on some hard substance of intrinsic beauty or value."

Materials Used in Cameos

The substances upon which cameos are cut include all precious and semiprecious stones, such as emeralds, carbuncles, amethysts, turquoises, agates, onyx, jacinth, and a number of others and also amber, mother-of-pearl, shells, coral, ivory, and precious metals.

Cameos may be cut from a material all of one color, but the term is usually associated with delicate carvings on a material having layers of different colors which serve to bring out the beauty of the design, sometimes as a background only, sometimes with tints and shades which shine through the translucent figures in certain places.

Stone Cameos

Onyx and the various forms of agate from which the largest number of stone cameos are cut, do not have their colors in horizontal, even layers, but with little bends and curves, thicker in some places than in others. This is due to the fact that the deposits were made in hollows of the rock by trickling drops of water which carried coloring matter in the form of metallic oxides. The layers took the shape of the hollows.

When the artist cuts a cameo he considers these variations in the stone as a part of the design, and tries to make them add to its beauty. Stone cameos must be cut with a diamond point or drill and grinding wheels such as are used in faceting. The height of the relief and elaborateness of detail give the carving its value. They are polished with diamond dust or emery.

Shell Cameos

A large number of the cameos now made are cut on the inner surface of shells such as the pearl oyster, the abalone, and other beautifully tinted sea shells.

Shell cameos are not so valuable as those cut from stone, but they are softer in color and often very beautiful. All the work must be done by hand, the tools being similar to those used for carving or engraving metal. They may be polished with rottenstone. Brown and white and pink and white shells are most adaptable to cameo cutting, as beautiful flesh tints may be secured where the color shows through a thin upper layer of shell. The human head and figure is the favorite subject for cameos.

History of Cameos

The earliest known were made in Egypt, where the scarab or sacred beetle was carved in stone or molded in pottery. Scarabs were worn as amulets. From there the art was taken to Greece where it was per-

fected. No modern cameos equal in beauty the finest of the Greek specimens which are very valuable and are preserved in museums and private collections among their choicest art treasures.

The Romans were great collectors of cameos, but they employed Greek workmen to make them. In the Middle Ages the Byzantine cameos were less graceful and beautiful because all their art was more rigid and formal.

At the time of the Renaissance when everything classic was in fashion, the ancient cameos were imitated and often actual forgeries were made of the signature on the back. Queen Elizabeth was a great lover of cameos and her own portrait was carved on a number of them.

Italy is the source of most of our cameos today, but they are no longer made by great artists and so do not equal the older ones.

Imitation Cameos

Imitation cameos have been made of glass either cut and polished or simply molded, or of pottery. The Wedgewood pottery medallions look like cameos with their green, violet, buff, or pale blue backgrounds, and white figures.

Intaglios

Intaglios are the exact opposites of cameos, as the design is cut into the stone instead of being carved in

relief. As intaglios have been used principally for seals they are nearly always small and oval in shape. Intaglios are often in the form of crests or monograms with which the wax is impressed in sealing a letter.

Scarab

The scarab, which was the earliest form of carved cameo, has remained as an individual cutting to the present time. The sacred beetle of Egypt was a symbol of immortality and many of the little green or blue stones cut in this form have been found in the tombs and ruins in Egypt, but many also have been forged to imitate these treasures. The scarab is cut with the beetle's wings folded, but it is often set between two long outspread wings.

History of Cutting

The art of gem cutting is very ancient. As early as 1285 an organization called a guild of gem cutters existed in Paris; and it is probable that the art was practiced long before this.

One Ludwig Van Berguen, or Louis de Berquem (French), is given credit for first cutting a diamond with facets in about 1460. It is said that the king sent him three diamonds to cut. The first one had a very romantic history, being taken as spoils of war, and it may still be seen in the collection owned by the Spanish royalty. Throughout the sixteenth century the style which de Berquem introduced prevailed.

Chapter XIII

SETTING OF STONES

Characteristics of Good Settings

The setting of precious stones is exceedingly interesting work and requires great skill in order that the stones may be held firmly and yet show no unnecessary thickness of metal and no mark of the process.

Tools

The tools used in setting stones consist of:

Drills for making holes in metal or flat stones.
Scorpers for hollowing out the metal.
Piercing saws, files, and shears.
Push tools for pressing the stone home in its setting.
Setting or pressing tools for pushing down the tops of the claws.
Graining tools, hollow at the end, for shaping the metal into grains.
A roulette wheel with depressions like a tracing wheel for making a row of small grains upon a narrow edge of metal.

Triblets for turning up and shaping rings or collets.
Sticks of wood with a knob of cement at the top upon which small articles are held firmly while working with them.
A wax stick to pick up stones when trying them in the settings.
Burnishers and polishing materials.
Stones for sharpening and burnishing.

Styles

Settings may be open or closed, that is, they may show the lower part of a stone between the parts of the setting or from beneath or they may be like a solid cup showing only the top of the stone.

The principal settings are:

Claw or Coronet
Cut Down
Gypsy or Flush
Roman
Rubbed Over, Band, or Clamp
Thread or Thread and Grain

Claw Setting

The claw setting is the one most used for diamonds and other very brilliant stones because it allows the light to strike the lower part of the stone and add to

its brightness. It is made by cutting a strip of metal the proper size for the setting desired, and bending it into a ring which is soldered together. This is called the "collet." The collet is then put on the cement stick where it is held firmly while a tiny shelf or "bearer" is cut into the inner surface about one-sixteenth of an inch from the top. This shelf is for the stone to rest on just below the girdle. Some stones are shaped so that they do not require the shelf. Then the metal is cut out above and below this shelf, leaving the claws. A disk of metal is soldered on the lower claws to form a base and a hole is drilled in it for the point of the stone if it is a brilliant cut. The claws are forced apart to receive the stone. After placing it, the ends of the claws are bent down over the stone, shaped, and smoothed down.

Cut Down Setting

A cut down setting is cut at first like the claw setting, but instead of having claws cut out it is left as a solid ring. The lower edge of this collet is beveled off to form the base. When the stone has been placed on the bearer the upper rim is pressed down over it and small sections of the rim are cut out so that it will fit perfectly.

Flush Setting

A flush setting is made by drilling a hole in the solid

metal just large enough to hold the stone. The metal outside the hole is filed down so as to leave a narrow ring or bank extending above the edge of the stone. This bank is pressed down on the stone until the ridge has disappeared and then filed till it is true and level.

Roman Setting

A Roman setting is made like a flush setting by drilling a hole for the stone, but in this case a groove is cut all around the stone and very near it. Then a smooth round tool is rubbed along the groove until the rim of gold next to the stone is pressed down on it. The groove is then smoothed down and the setting finished and polished.

Band Setting

A band setting is made with a strip of metal bent into a ring which is soldered onto another flat piece of metal or on the face of the pin or other piece of jewelry. A smaller ring for the bearer is soldered inside of the band or the stone may rest on the metal at the bottom of the band. The top is pressed down over the stone. The clamp setting has part of the border filed away, leaving little points to bend over the stone.

Thread Setting

A thread or "thread and grain" setting may be used

where a number of stones are set close together. Holes are drilled for the stones as in the flush or Roman setting but, as there are spaces between the stones to be filled in, little curls of metal are scooped out, pushed up against the stones, and rubbed over with the graining tool. They hold the stones fast.

Settings for Special Stones

Stones cut en cabochon usually have closed settings. Enamels or cameos, which should not have any pressure for fear of damage, are set from the back by making a ring deeper than the enamel and bending over the upper rim before placing it. Then a ring is put in the collet back of the stone and soldered on with soft solder or secured with tiny pins.

Pearls have holes drilled in them and are secured by pins to the setting. Pearls may have plaster of paris put in the setting to form the desirable white background and other jewels may have metal foil back of them tinted to enhance their color.

Jewelers can buy the collets of stones already made. or they can buy "gallery" for claw settings with the claws already cut. This can be cut the right size, soldered together, and finished. Rings and other pieces are often made in the factory complete except for setting the stones and finishing.

Chapter XIV

ENAMEL IN JEWELRY

Characteristics of Enamel

On many pieces of jewelry we see colored decorations which look like precious stones or colored glass, we cannot tell which. Sometimes the color has fine lines of gold running through it. Sometimes it is clear and sometimes opaque. It may be even with the surface and polished or it may be uneven and unpolished. In jewelry from Hungary or Russia, we find that the colored material is enclosed by metal at the sides, but there is none at the back. We can see the light through it.

If it has metal at the back we can sometimes see fine patterns drawn underneath the color which give it golden lights, while some French jewelry has an effect of gray and black and white and just the faintest color.

All of these varieties and their cheaper imitations are called "enameled" jewelry. The decoration is made of melted glass which is poured or spread upon the metal in very small quantities and then put into a

hot oven to be "fired," or hardened onto it. Enamel color is not on or under the glaze, but *in* it and it must be annealed to the surface of the metal.

Enameling

The name enamel is given to any hard, glassy outer coating. Enamel may be a coating fused on glass, pottery, metal, or any mineral surface that will stand enough heat to fuse it, but when we say "an enamel" we mean enameled metal.

There are seven different kinds of enamel:

1. Cloisonné
2. Champlevé
3. Repoussé
4. Baisse Taille
5. Plique à Jour
6. Encrusted Enamel
7. Painted Enamel

Cloisonné

The name cloisonné is the one we know best because so many beautiful pieces come to us from Japan and China, but cloisonné enamel was known in Eastern Europe fifteen hundred years ago.

According to one story, an early queen of the Byzantine kingdom brought enamelers with her from the East, but the Greeks and Romans also made cloisonné enamels.

Cloisonné is named from "cloisson," which means a wall. Enamel is melted glass poured on metal, and hardened in the fire. But the goldsmiths who invented cloisonné found that the paste would not remain evenly spread on the surface but would become thicker in some places and different colors would run together. Therefore, gold wire is soldered on the surface of the metal first and then the enamel is poured into the little cells which have been made. The wire walls hold the glass in place until it is fired. Sometimes a piece has twenty layers of thin glass and needs to be fired twenty times. Then, when the glass is even with the top of the wire, the surface is polished and only shows the fine lines of gold running through the color.

Champlevé

Champlevé is made in a different way. Instead of soldering wires on top of the metal, the jeweler digs out troughs in it and thus makes the hollows into which the glass is poured.

Cloisonné is a goldsmith's method because gold is not only too precious to be wasted but it is a very soft metal and easy to handle. Champlevé was invented by men who worked in copper and bronze. They could use thicker pieces and did not object to losing a part of the metal.

Champlevé is sometimes used for gold and silver,

especially in India, but it is more often used for copper and bronze. Craftsman jewelry is usually champlevé or repoussé.

Repoussé

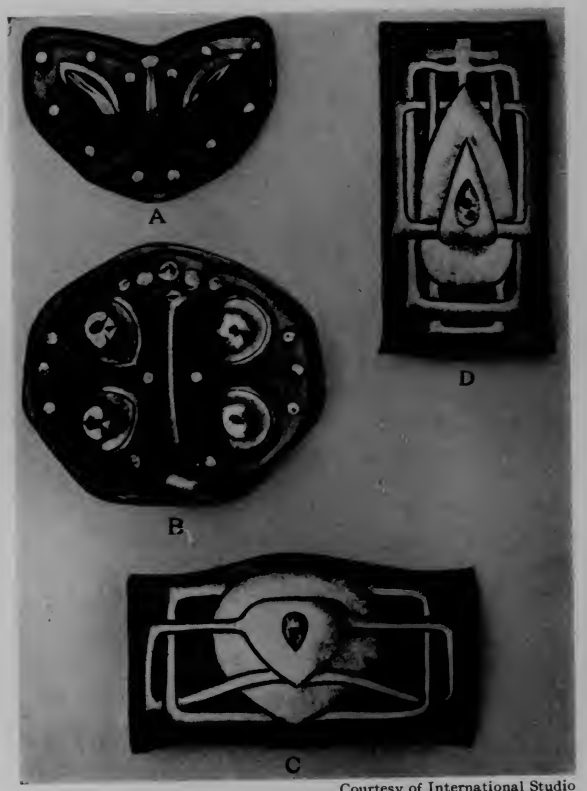
Repoussé enamel is made by beating up the ground and filling in certain hollows with enamel. In both champlevé and repoussé the metal may be seen in broader surfaces than in cloisonné. The jeweled brooches in beaten copper and aluminum in Figure 5 illustrate different forms of champievé and repoussé enamel work, showing the broad surfaces of metal.

Baisse Taille

Baisse taille is a translucent enamel on a ground which has been chased or engraved in patterns which can be faintly seen through the color. Sometimes the uneven lower surface allows the enamel to be heavier in certain places which gives it a deeper color and a shaded effect.

Plique à Jour

Plique à Jour is like a screen of metal with enamel in the spaces. It may be compared to a stained glass window as the enamel is held by the metal just as panes of stained glass are held by the leads. It is often called Russian enamel because it has been used so much in that country. It is like the open setting of



Courtesy of International Studio

A and B—Beaten Copper. C and D—Beaten Aluminum

Figure 5. Jeweled Brooches

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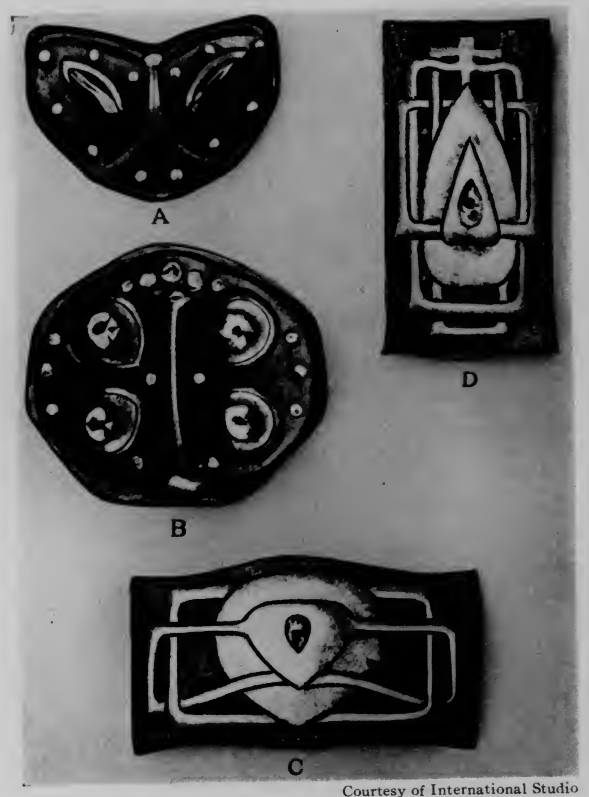


Courtesy of International Studio

A and B—Beaten Copper. C and D—Beaten Aluminum

Figure 5. Jeweled Brooches

stones and, with the Russian wire enamel, made of twisted filigree wire, may have been brought from Persia as a substitute for the glass imitations of jewels.

Encrusted Enamel

Encrusted enamel is a fused glass coating on a raised pattern. Sometimes the enamel covers the entire surface and sometimes appears in drops or beads producing a jeweled effect.

Painted Enamel

Painted enamel reached perfection in France in the city of Limoges where there were in the fifteenth and sixteenth centuries great factories for the making of enamels of many kinds. The most famous of these were those painted "en grisaille," or gray produced by painting many layers of white on a dark background, the shading being produced by the various degrees of thickness of the color and by black lines or hatchings. Blue and green were used for the background as well as black. This kind of enameling is not much used today as people care more for rich warm tones.

Enamel Colors

Enamel may be either opaque or translucent. Gold is the best background for translucent enamels as its brightness shines through and enriches them. Silver,

however, is often used and sometimes copper, brass, or alloys of gold and silver.

Opaque color may be enameled on any metal which can stand the heat of firing.

The color of the glass is due to metallic oxides, some of which leave the glass quite clear and others destroy its transparency. Different colors are produced not only by the kind of oxide but also by the degree of heat applied. Different enamels require different degrees of heat and the hardest must be fired first. There is always a risk in firing. The artist can never be quite sure that some accident will not spoil his work.

Transparent Colors

The transparent colors are produced as follows:

Sapphire-blue	by cobalt
Turquoise-blue	by copper with soda base
Emerald-green	by copper
Brownish-green	by iron
Ruby-red	by copper protoxide
Rose-pink	by gold and tin
Pale-yellow	by silver
Brownish-yellow	by iron
Purple	by manganese
Black	by mixture

Opaque Colors

For opaque colors iron is used for red; antimony, lead, and iron for yellow; chromium for green; and oxide of iron for white.

History

The first use of enamel was probably to take the place of precious stones or of colored glass in imitation of stones. The Hungarian and Russian enamels still show by their size, shape, and variety of colors that this was their original purpose.

The Egyptians did not make true enamels but they used colored glass inserted in gold and stone. The Greeks soldered designs in gold wire on their jewelry and vases and afterwards filled the hollows with enamel.

Germany and France have done enameling for many centuries as well as the countries farther east. Champlevé is said by some to have originated in Ireland where many arts were practiced during the early Christian centuries. Limoges, France, was the most celebrated center for enamels.

Modern enamels could be as beautiful as the older ones but workmen are not so willing to devote the length of time necessary to make their work perfect.

Chapter XV

DESIGN IN JEWELRY

Importance of Design in Jewelry

Design is becoming an increasingly important matter in the making and choosing of jewelry. The time has passed when a quantity of showy stones crowded together without thought of design or arrangement can be considered beautiful.

Jewelers are returning to the older styles of goldsmith's work in which precious stones or enamel become a part of a beautiful pattern.

Some manufacturing jewelers make a specialty of resetting the stones from jewelry made a few years ago, when designs were heavy and meaningless. One jeweler's catalogue says: "Never before has Dame Fashion been so exacting in her demands that jewelry shall possess true artistic merit as well as commercial value."

Relation of Design to Material and Purpose

The jewelry designer must consider three things:

1. His material.
2. The use of the article.

3. Beauty of form and workmanship.

Designs in metal differ from those in stone or wood or cloth because metal must be handled in a special way and also because metal has peculiar beauties which should be brought out by the design.

The color of the precious metals, their lustrous surface, the forms which they take when melted or drawn out into wire, are all important to the designer.

The use to which the article is to be put also affects the design. Designs for pendants should be different from those for rings and long chains are not made after the same patterns as necklaces.

Those who are constantly handling jewelry will find it fascinating to study different types of design and to discover for themselves why some pieces seem to grow more beautiful as they are better known, while others which at first seemed attractive after a while become tiresome and tawdry. They will sometimes find that the design is inappropriate for its use; sometimes that it is badly balanced or sprawling or heavy instead of light, graceful, and beautifully proportioned.

Platinum, gold, and silver are all dense, or fine grained. All are soft. Gold and silver melt at a moderate temperature but platinum requires intense heat. One may, therefore, see wire or filigree jewelry in all these metals, but grains are only found in the gold and silver.

Some of the greatest goldsmiths in the world have built up their designs from wire and rings and the round or flattened grains, which seem to form themselves into beautiful patterns almost without effort. Jewelers make " units of design " by cutting wire into small pieces and bending them into fancy shapes. One designer [1] gives 700 different forms which can be made from pieces of wire an inch long. These tiny pieces can be combined in chains or shaped into ornaments to form rhythmic patterns more easily than they could be drawn on paper.

Filigree jewelry is like lace work, yet the tiny wires are not quite like threads of lace. Their stiffness suggests a different kind of material and their luster gives an added beauty.

The color and luster of metals add greatly to the variety and beauty of design. Polished surfaces reflect white or colored light in such a way as to give not only brightness but different tones of color in the different planes of surface. The deeper, concave parts of gold ornaments look redder than the convex parts. One of the greatest charms of wire or filigree ornaments is the play of light on the fine twists and coils.

Modeling, casting, and chasing also give this variety of color and brightness and, if finely finished, the work seems to need no further decoration.

1 R. L. B. Rathbone.

Use of Gems in Design

Precious stones or enamel, however, usually complete the ornament. They can be used vulgarly, that is, without any thought except to display the size of the stone, or their beauty may be increased many times by art in cutting and setting. An irregular or imperfect stone which forms part of an artistic design is far more beautiful than a perfectly regular stone in a setting which has no character. Figures 2 and 3 illustrate good and poor use of precious stones in a design.

Sometimes individual stones are so large and so beautiful that the jeweler fears to add anything in the way of goldsmith's work but even such splendid gems will shine more brilliantly against a background of appropriate enamel, chasing, or modeling which give depth, contrast, and variety. In this case the color and design of the background should lead up to the principal feature and not away from it.

A diamond should not be surrounded by brightly colored stones as their color distracts attention. It may be most effectively displayed against dark blue enamel or black onyx as the dark, retreating colors give it depth and contrast. Platinum forms a more beautiful background for diamonds than gold because its bluish-white brilliancy reflects and increases the same characteristic in the stone.

Nearly all colored stones gain in beauty by being sur-

rounded by diamonds, because the clear, white stones do not call attention from the colored ones but apparently add to their luster. Sapphire and pearl jewelry is particularly rich in effect because of the contrast between the rich blue and the pearl-white.

Form and Line in Design

The one feature of design which is most important yet least understood by the makers of our commercial jewelry is beauty of form and line in the construction of ornaments.

A straight line is the simplest form but the hardest to make beautiful. Bar pins may be artistic because they have beautiful detail in the decoration, but many of them are simply stupid even if they are set with a row of fine stones.

Curves

Curving lines are more graceful, but they may be sprawling and not restful. *L'Art Nouveau* jewelry often has beautiful lines and forms in it but the general impression is not satisfactory. It lacks dignity because it seems to wander without a proper sense of balance and restraint.

The Foundation of Good Design

Good design must first be built on a well-proportioned geometrical figure as a foundation. The lines of this

figure may not show but they must be in the artist's mind. Even the bar pin, if it is designed at all, must be treated not as a simple line but as a narrow rectangle.

The most common figures are the circle, square, oblong, diamond, and ellipse, all of which may have irregular edges or be bent in such a way as to suggest a variety of shapes. Heart shapes are only modified triangles and crosses are made of two oblongs. Flower designs and scroll patterns, properly proportioned, will be seen to fit into a geometrical framework, and even horseshoes and wish-bones, which are happily less common than they used to be, owe their attraction to their graceful elliptical shapes rather than to their suggestions of horses or chickens.

The French comb shown in the Frontispiece is an example of perfection of balance in a design. The geometrical figure upon which the design is built is an equal-sided triangle. However, the graceful curves do not follow the line so closely as to seem stiff. This comb also illustrates the effective use of gems in completing a design.

Pendants are more graceful when the length is greater than the width. Pear shapes, which are ellipses drawn out to a point, as well as crosses and dropping ornaments which give a long pointed effect, are beautiful when they emphasize the fact that they are hang-

ing ornaments. The elongated shape is better for scarf-pins because it suggests vertical lines which correspond with the general lines of the tie.

Brooches and rings with a markedly pointed effect are less satisfactory. The abnormally long marquise rings worn a few years ago looked badly proportioned and uncomfortable. For both brooches and rings, radiating designs are best, although designs moving around the border are also good.

Types of Decoration

The motives or elements of decorative design may be either natural, conventional, or abstract.

Natural designs imitate nature as much as the material will permit.

Conventional designs suggest nature but are simplified and adapted to the purpose of the ornament or the pattern.

Abstract designs are made up of repeated lines and patterns which have no intentional resemblance to natural forms, though sometimes it is hard to draw a clear line between very much conventionalized nature and abstract patterns.

Natural designs in jewelry are such ornaments as coral roses, ivory jewelry tinted in the natural colors, or flowers, birds, and insects enameled to imitate nature. Such jewelry, however, is usually of the novelty type.

Fine jewelry is more or less conventionalized even when it suggests nature. There is something a little bizarre in trying to represent so fragile a thing as a flower in hard metal and stone. The designer therefore makes his rose or butterfly exquisite in its own way but does not try to change the character of his material. Figure 6 is an example of a design in which the flower and leaf forms have been well-adapted to the material.

He must know his plant well in order to simplify it without losing all its character. Too often the reason that designs suggest no definite flower or leaf is that the artist has not studied the one he wishes to represent in such a way as to bring out its characteristics.

Elements of a Design

Pattern designs are made up of lines, forms, and spaces.

1. There must be a center of interest. In jewelry this may be a precious stone or some feature of the workmanship.

2. The pattern should be well-distributed and have proper balance. One side, for instance, should not seem too heavy for the other. It should follow the shape of the ornament.

3. The parts of the design must harmonize and be well bound together. It should not be too much broken

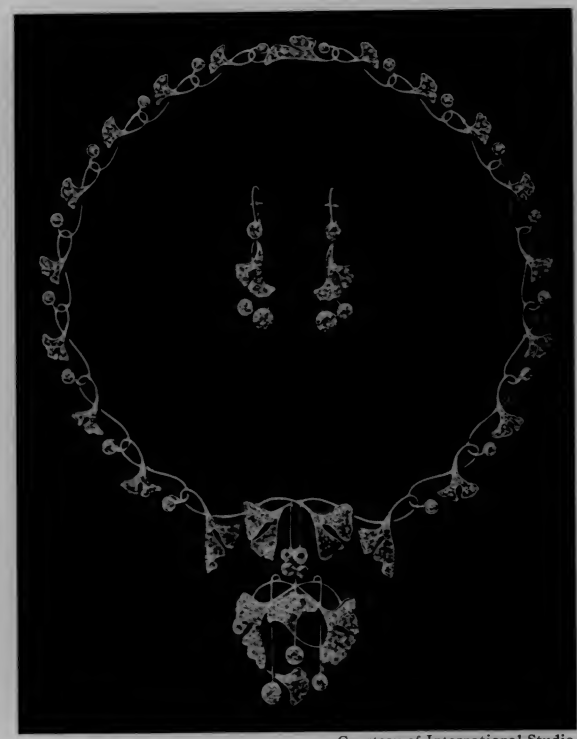
up, and if the ornament has several sections some feature of the design should cross from one to the other. Designs may radiate from the center outward or from the rim toward the center. They may move around the border — with attention on the outer edge, with attention on the inner edge, or with attention equally divided.

The kinds of lines to be used depend on the use and shape of the ornament as well as on its material. Filigree and enamel work have fine traceries, while modeled or carved work, cameos or intaglios, have bolder outlines. Straight lines steady a design while curving lines give it grace and lightness. Formality adds dignity to design.

Design in Different Countries

Masters of decorative design were found in the East — in Persia, Syria, India, and Damascus. The artists of the Far East have been careful followers of tradition and have rigidly obeyed the rules of art as they were worked out by earlier craftsmen. Their lines are smooth and flowing and their details perfect.

Japanese art is very naturalistic and often rugged. The older art is wonderfully beautiful as the Japanese are most keenly alive to the subtle beauty of natural forms. They represent in art fine differences in texture and in form which other people have not noticed.



Courtesy of International Studio

Figure 6. Necklace and Earrings of Brilliants (Austrian Design)

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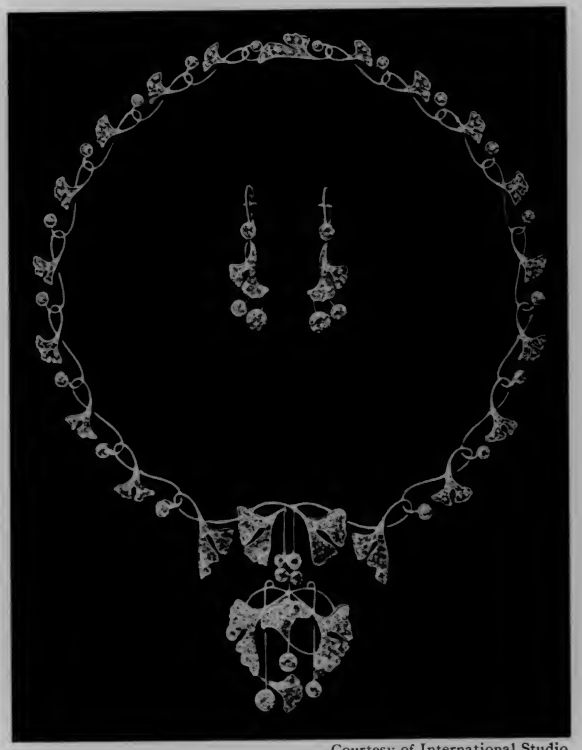

Courtesy of International Studio

Figure 6. Necklace and Earrings of Brilliants (Austrian Design)

Chinese art is more conventional. The designs are more purely ornamental and not so close to nature. The Chinese have not allowed their art to be cheapened to suit Western demands as the Japanese have, but both these countries have lost something characteristic.

Of Byzantine design, which is the background of Russian and Italian jewelry, Walter Crane says: "Whether in building, carving, mosaic, or goldsmith's work, it impresses one with a certain restraint in the midst of its splendor; a certain controlling dignity and reserve appears to be expressed even in the use of the most beautiful materials as well as in design and the treatment of form."

Egyptian art is being revived in the figures of the scarab or winged beetle. It always has dignity and orderly simplicity.

Benvenuto Cellini was a very noted Italian goldsmith and artist of the sixteenth century. Writing of the Italian designers he says: "In Italy we have several different ways of designing foliage: the Lombards, for example, construct very beautiful patterns by copying the leaves of briony and ivy in exquisite curves; the Tuscans and Romans . . . imitate the leaves of the acanthus with its stalks and flowers curling in divers wavy lines, and into these arabesques one may excellently well insert the figures of little birds and different animals." The Italians excel in mosaics and

cameo cutting as the French have always excelled in enamel work.

One of the most delightful writers on jewelry and jewelry-making was the old monk, Theophilus, who lived in the eleventh century. He told designers that they must be very humble and look to God for inspiration. This chapter may well close with his quaint words: "Whatsoever thou art able to learn, understand, or devise in the arts is administered to thee by the grace of the sevenfold spirit, the Spirit of Wisdom, the Spirit of Understanding, the Spirit of Counsel, the Spirit of Fortitude, the Spirit of Piety, and the Spirit of Fear of the Lord."

Part IV—Articles of Jewelry

Chapter XVI

STANDARD ARTICLES

Rings

Rings are the most typical and common forms of ornamental jewelry. They may be of several varieties:

1. A cylindrical band, plain like a wedding ring, or carved and set with stones or otherwise ornamented.
2. The upper side broadened for ornament, usually with stones.
3. Spiral or serpentine form with several coils.
4. Signet ring.
5. Open on one side.

Wedding rings are sometimes cut from a bar of metal in order that they may be equally strong at every point. Other simple band rings are made by soldering the ends of wire together.

The broad top type may be made by flattening the

band or soldering on another piece. Gem settings are usually put on in this way.

When open on one side, the ends of the wire are carved in ornamental shapes. Spiral rings are coiled wire.

A cheaper method of making rings is to stamp the metal with a die or to melt it and run it into molds.

Rings for men are heavier than those for women and when set with gems and stones are usually set lower, sometimes having the top of the stone little above the surrounding metal. Men's rings are sometimes encrusted with small stones forming part of a design. Signet rings, rings bearing the emblems of masonic or fraternal orders, and class rings of special design are more common than those worn merely for ornament.

Pins

The pin serves a useful as well as an ornamental purpose. There are three general types:

1. The scarf pin, which has a stem pointed at one end and a knob or ornament at the other.
2. The brooch or safety pin, which has two parts. The upper part is of various shapes, usually ornamented. The pin is attached on the under side by a hinge or spring and fits into a catch or sheath at the other end.

3. Double pins, which are connected by chains.

Scarf pins are generally made of round gold or silver wire. The wire may be steel or brass plated with gold or silver, but if it is solid, the head or ornamental top may be shaped from the end of the wire. Usually the top is soldered on. The shape of the top is more often rounded or conical than flat.

Brooches and bar pins may be round, oval, oblong discs or various fanciful shapes. Pins for lingerie or collars are simple in shape and design, but brooches offer an unlimited field for decoration with goldsmiths' work, gems, or enamel.

Pins were used in ancient times in place of buttons for holding the folds of garments together and resembled buttons in shape.

Hairpins are split into two prongs. Those found in the Jewelry Department may be of tortoise shell, perhaps carved and ornamented, or of horn or shell with gold, silver, or jeweled tops.

Chains

Chains are of two general types:

1. Chains made of finely twisted or plaited wires.
2. Chains made of links, balls, or small pieces joined together.

Twisted and plaited chains are made flexible by the twist of the wire which acts as a spring.

Link chains have pieces or sections in endless variety. The principal ones are:

1. The cable link, an ordinary oval or round ring.
2. The curb link, the cable link twisted. An open curb has the sides pushed slightly together. A close curb has the sides pushed close together. Trace links have the curb elongated.

These may be modified or ornamented by hammering or chasing.

Fancy chains are made with bent, coiled, and twisted pieces of wire made into small patterns and connected by rings. Ball or bead chains are also made by stringing perforated balls on a flexible wire.

There are three types of men's watch chains.

In one type the chain is worn across the vest, between the two pockets. On one end there is a swivel for the watch, and on the other a spring ring for a knife, cigar cutter, etc. This is a very popular style.

Another type also has a swivel on one end and a spring ring on the other, but in the center of the chain there is a bar for holding the chain in the vest buttonhole, and a drop chain for a charm.

The third style goes to one pocket only and has a bar for attaching to the vest buttonhole and the drop chain for the charm.

The links or sections of ordinary chains are made

and put together by machinery but hand-made chains are stronger because of the annealing of the wire.

Necklaces

Necklaces are made in four general forms:

1. The close fitting collar-like band made of numerous stones, beads, filigree, or ornamental tablets.
2. The chain with single pendant as the lavaliere.
3. A row of beads, usually graduated in size, on a wire or chain. The beads may be of stones, as pearls, amethysts, amber, coral, or of plain or filigree gold. (For beads, see Chapter XVII.)
4. Several chains or strings of different lengths worn one above the other.

The pearls used for pearl necklaces may be large or small and may be either graduated or of equal size. The clasps may be studded with diamonds or other precious stones, but otherwise the pearl necklace is an example of perfect simplicity. The gems are pierced and strung on a wire or cord without pendants or ornamental treatment of any kind. Chains for lorgnettes or fans which are made of seed pearls may have small diamonds or other stones set between.

Unless made of pearls or ornamental beads, necklaces almost always have pendants. The chain is often

very light and simple; all the attention is directed to the pendant or row of pendants.

Clasps for necklaces are either spring rings or barrel clasps.

Pendants

Pendants may be suspended from any kind of chain or ornament, but are most used for necklaces. There are many kinds, among them:

1. The locket to hold a picture.
2. The miniature.
3. The cross or medallion.
4. Single gems or cameos.
5. Lavaliere ornaments.

This list does not exhaust the possibilities of the pendant as it is the thing upon which the goldsmith may use his greatest skill.

The locket may be plain or ornamented with precious stones or enamel. It may have but one piece or be made in two parts hinged and clasped together.

The miniature is painted on ivory or porcelain and usually set with small brilliants which make it very ornamental.

The cross is a favorite form of pendant, although its religious meaning is often forgotten in the ornamentation and the gems with which it is set. Medallions

or other more massive pendants are ornamented with enamel, gems, or pearls.

Single gems or cameos form beautiful pendants when hung on slender chains.

Lavaliere ornaments which are named for a famous French beauty, are the most popular form of pendants at this time. They are made of very delicate filigree work of beautiful design and set with precious stones. The lavaliere pendant is an effort on the part of jewelers to make the goldsmith's work contribute to the beauty of the stones instead of merely forming a background.

Necklaces and pendants are most popular when fashion decrees the open neck style of dress, which requires some little ornament at the neck.

Bracelets

Bracelets are rings worn on the arm. They may be:

1. Closed rings or bands.
2. Open on one side.
3. Spiral coils.
4. Hinged and closed with a clasp.
5. Flexible bands made of links.

The simplest form is the closed ring which is made of wire or tubing drawn through a draw plate to the desired size. After annealing it is bent into shape and the ends soldered together.

The open bracelet is made in the same way but the ends are finished and ornamented instead of being soldered together.

Spiral coils are also made of wire and are usually finished with a serpent's head.

Hinged bracelets are usually made of tubing though they may also be solid. They are made in two pieces connected with a hinge at one side and with a hook or clasp at the other.

Flexible bracelets are made of links or tablets so connected that they may be bent at each joint. The flexible bracelets made for wrist watches have springs in each of the sections so that they may be pulled apart when drawn over the hand.

Bracelet makers buy the wire tubing already drawn and then cut, join, and design the bracelet as they wish.

Earrings

Earrings are ornaments for the ears. They are of two kinds:

1. Ornaments which are set against the lobe of the ear.
2. Hanging drops or pendants.

The use of earrings was formerly supposed to require the piercing of the ears and as this was considered a barbarous custom, earrings went out of fashion, but at present, by means of a fine screw at the back of

the ring they are quite secure and therefore the fashion has revived.

The favorite form for the ornament set closely against the ear is the single large pearl, either real or artificial. Pendant earrings have a tendency to be long and rather oriental in effect.

Collar Buttons

Collar buttons differ in the length of post and shape and size of the head.

For the front of the collar a longer post is required than for the back.

The head may be ball-shaped, dome-shaped, or elongated. The latter type is very useful in holding the necktie in place in the back.

The buttons made in one piece are very strong. The soldered ones are more liable to break.

Cuff-Links

Cuff-links are of two varieties:

Stiff bar buttons have ends of unequal size, connected by a stiff bar. The end which does not show is usually bean-shaped to enable it to be inserted easily. These are very strong, especially suitable for use in stiff cuffs.

Loose links, with the two ends alike, are joined by flexible connections. These may be worn in all styles of cuffs, and are especially desirable for the soft styles.

Cuff-links for evening wear are of mother-of-pearl, either all pearl, or with a tiny rim of platinum or gold.

Studs and Vest Buttons

Studs are of two varieties:

Rigid, like small collar buttons, the backs being smaller and the posts shorter than in the regular collar button.

Flexible, small balls of gold or mother-of-pearl mounted on an adjustable back.

Vest buttons made of mother-of-pearl for wear in white vests are mounted on adjustable backs.

Evening Sets for Men

Evening sets for men are made of mother-of-pearl and consist of either studs and links, or studs, links, and vest buttons.

Other Articles

Many other little articles are found in the Jewelry Department which are affected by changing fashions.

Buckles and clasps for belts and metal girdles are made of gold and silver and often beautifully carved and ornamented with precious stones or enamel.

Smelling bottles, powder boxes, chatelaines for holding a number of small articles, and other trifles are always subjects of interest.

Chapter XVII

CRAFTSMAN JEWELRY

Hand-Made Jewelry

Hand-made jewelry and metal work has been revived as an artistic craft and has been steadily gaining in commercial importance. There is no attempt to compete with factory-made articles in mechanical perfection. The workmanship is often intentionally rough in order to show that it is a handmade product.

Jewelry of this type approaches the Egyptian, Moorish, or oriental in design and is sometimes barbaric but always individual and at its best shows an appreciation of the possibilities of metal work and the beauty of metal forms and textures which no machine products can even suggest.

Not gold or platinum but silver, copper, brass, bronze, German silver, and aluminum are the mediums for art metal work. (For German silver see "Leather Goods Manual," for aluminum "Housefurnishings Manual.")

Copper and Its Alloys

Copper has not the beauty of gold or silver but it is

associated with the precious metals as an alloy and is also the most important element in brass and bronze. Copper is malleable and ductile, but tougher and harder than gold or silver.

Native copper exists in small quantities in connection with copper ores but it is so easily affected by the atmosphere that the surface is always dull and tarnished. There are nearly two hundred distinct copper ores many of which carry small amounts of gold and silver.

Sources and Extraction of Copper

Copper has been mined in Germany, England, and Spain as well as in Canada, Mexico, Australia, and South America but the most important fields are in the United States. The Lake Superior and Michigan mines are the oldest in this country, but the production of the Montana mine field is now the largest in the world.

The metal is usually extracted from the ore by what is called the "dry" method. The ore is first "roasted" in heaps out of doors by means of wood which is so placed that when it is lighted it sets fire to the sulphur in the ore. The reduced ore is then smelted in either a furnace or a Bessemer converter.

When very pure copper is needed or when the ore contains gold or silver, the electrolytic method is em-

ployed. This is similar to electroplating. A plate of impure copper is attached to the positive pole of a dynamo and a thin sheet of copper to the negative pole. They are then plunged in an acid which causes an electric current to pass from the first piece, called the "anode," to the second, or "cathode." The copper of the anode is dissolved and deposited on the cathode as pure copper, while the gold, silver, and other ingredients fall to the bottom of the tank.

Brass

Brass is one of the most important alloys of copper. It is composed of varying proportions of copper and zinc with the addition of small amounts of tin, aluminum, or lead. High brass, which is the best for etching with acid, has a high percentage of zinc, consisting of 65 per cent copper and 35 per cent zinc.

Brass for ornaments is often given the ormolu finish which makes it look like gold. This finish is secured by dipping the brass in a solution of nitric acid, hydrofluoric acid, and zinc. It is then dried and coated with lacquer and polished.

Bronze

Bronze is an alloy of copper and tin with small quantities of other metals, such as phosphorous, lead, and zinc. The bronze for vases and statuettes is

87 per cent copper, 7 per cent tin, 3 per cent lead, and 3 per cent zinc. Bronze for bells, or bell metal, is 75 per cent copper and 25 per cent tin. The Japanese make two bronze alloys for their art work. The first is copper 97 per cent, gold 3 per cent, and the second copper 75 per cent, silver 25 per cent.

Affect of Air on Copper and Its Alloys

When copper is exposed to the air for some time it will combine with the oxygen of the air and turn a dark brownish color. If moisture and carbon are in the air it will turn green. This film of color is called the "patina." The patina can be given artificially to both copper and bronze. There is no other metal which takes so many beautiful colors as the result of its combination with other substances. The patina of bronze alloys is described in Chapter XXVIII.

Methods of Decoration

Etching, engraving, chasing or repoussé work, piercing, and enameling are the methods by which the designs for craftman jewelry are worked out and the decoration applied. (See Figure 5.)

For etched patterns the design is drawn upon the metal or transferred by means of carbon paper, and all other parts of the metal are covered with a protective coating of varnish. The article is then dipped

into nitric acid which cuts into the uncovered portions.

Engraving and chasing are done with steel tools. By engraving, a part of the metal is cut away. Chased or repoussé work is raised above the surface. For chasing, the article is placed on a block of wood and the design first traced with a blunt steel chisel, then the background is beaten down with other tools. If the design is to stand out from the surface the article is placed on a pitch block (see page 66). After the design is traced the piece is turned over and it is beaten up from the back, then turned again and the background beaten down.

Piercing is done with a sharp chisel on the traced lines or with fine steel saws.

Metal Finishes

Many different finishes are given to metals.

Silver may be oxidized or given a satin finish. Oxidized or blackened silver is produced by the application of a compound of sulphur with either potassium, barium, or ammonia. For a soft dull finish it is put in a "pickle" of sulphuric acid and then polished with emery and jeweler's rouge. When silver is heated to redness a thin white scale forms on it, called "fire scale" which can be removed with acid or may be polished off. If the scale is broken it must all

be taken off, but if it is gently rubbed down it gives the metal a soft luster which is more beautiful than the bright finish.

Copper is given a bright finish by dipping it in nitric and sulphuric acid. A satin finish is produced with a wire brush. It is oxidized with potassium sulphide and ammonia, and given the familiar green finish in a number of ways. A green film is produced on copper whenever it is brought in contact with ammonia or even common salt and water, but this color may be varied by using different chemical combinations, while others will color it red or brown. Copper may be given an iridescent coloring by passing it through a flame. Brass may be colored gray, steel blue, bronze, or green by the use of various chemicals.

Aluminum is frosted or oxidized.

To make a finish permanent the metal must be lacquered with white shellac, banana oil, or a similar preparation, or it must be waxed.

Enamels

The enamels used in craftsman jewelry are opaque and jewel-like, and with the precious stones, such as baroque pearls, turquoises and turquoise matrix, azurite, and rhodonite, serve to complete and brighten the design. They are chosen for their beautiful colors rather than for their intrinsic value.

Beads

Real oriental jewelry may be seen in strings of beads, jade, ivory, coral, and semiprecious stones which are finished with carved pendants of curious design.

Bead chains are made of Venetian glass, mosaic, and oriental beads, combined with metal beads and slides with and without pendants. Some bead chains are woven in patterns on small looms. This art was developed in France as an industry for crippled soldiers after the war.

Beads are the most ancient of all forms of ornaments, unless we except flowers. Nobody knows who first invented beads. Perhaps it was some savage who found nuts or oak balls in the forest and threaded them together on a stalk of grass. Anything with a hole through it served at the beginning for beads—shells, fish teeth, claws of beasts, and seeds. But the great age of beads began with invention of glass, and the Egyptians, Carthaginians, and Phœnicians generally were skilled craftsmen at bead making.

Methods of Manufacture

The Near East is still making jewelry as it was made in the Middle Ages. In the Balkan country may be found tiny shops where they melt coins down to make silver jewelry. A strip of metal will be drawn by hand through the holes of a draw plate and the

wire formed by hand into rosettes and scrolls or bracelets, chains, and hat pins.

In out-of-the-way places throughout Europe the craftsman still makes quaint and beautiful ornaments by hand, but where the factory system prevails the craftsman has been driven out by the cheaper machine products. Now there is an educational campaign seeking to revive craftsmanship and see that handwork receives due appreciation.

Chapter XVIII

FANS AND FANCY BAGS

Types of Fans

One of the sections of the Jewelry Department is usually devoted to fans. Their ornamental character and the beautiful materials of which the finer ones are made suggest this department as the natural place for their display.

The principal types of fans used today are:

1. The Fixed
2. The Radial
3. The Brise or lamellar
4. The Folding

The fixed fan has a leaf immovably fastened to the stick. It is usually found in the simpler materials, such as the palm leaf fan or those made of printed gauze.

The radial fan is made of a strip of material pleated together and fastened to the handle with a pin so that when spread out it forms a circle with this pin at the center.

The Brise or lamellar fan is made of strips or blades

of thin wood or other stiff material fastened together at one end. When folded it forms a narrow oblong; open, a semicircle. The free ends of the sticks are laced together with ribbon or cord.

The folding fan has sticks or blades similar to the lamellar, but with a folded strip of paper, silk, or other material connecting the blades and extending about half the depth of the fan. When opened out this folded piece forms the leaf of the fan.

Materials

The sticks of fans are made of wood, ivory, bone, celluloid, tortoise shell, and mother-of-pearl. Most of these materials are described elsewhere in this manual. The wood used is light and easily splintered, except sandalwood, which is close grained, may be exquisitely carved, and has a delicate and permanent fragrance. Mother-of-pearl is composed of calcium carbonate, the same substance as the pearl. It is the inside surface of many varieties of seashells and occurs in the most beautiful iridescent colors. The pieces are usually cut in very thin layers which are glued or cemented to the wood forming the foundation.

The leaf of the fan may be made of gauze, silk, or satin, specially prepared skins, as parchment, vellum, kid (sometimes called chicken skin), of lace, quills or ostrich feathers, or of paper. These materials are all

described in the manuals for the Stationery, Silk, Leather Goods or Millinery departments.

Manufacture

Paper fans are made chiefly in Japan and China. Labor is so cheap in these countries and the workmen have become such adepts in handling the thin light wood, in making the tough rice paper, and in sketching their effective designs that other countries do not try to compete with them. The Japanese also make many fans of gauze and the Chinese of ivory and sandalwood exquisitely carved.

France is the European country from which we have obtained the greatest number of fans. Watteau and other French artists excelled in painting miniatures and other beautiful pictures upon them. The French have also made fans of lace, of embroidered and spangled gauze or silk, and have set mirrors in them. Vernis Martin invented the fine varnish or lacquer which is used on certain fans of the Brise type.

We have also Spanish, Italian, and English fans decorated characteristically with painting, gilding, and etching or printing.

The design of the lace fan shown in Figure 7 has many excellent features. The floral pattern is conventionalized in such a way that the flower form is preserved, and yet, at the same time, is well-adapted

to the material. The design is also so proportioned that it is effective, that is, does not appear fragmentary when the fan is only partly spread.

History

The fan originated in hot countries where it was used as a shield from the sun as well as for the purpose of creating a current of air and brushing away insects. It was a badge of rank and a luxury, and was usually carried and swung by slaves. On ceremonial occasions fans were carried by poles as flags or banners. These ceremonial fans were very large with long handles or standards beautifully decorated. The Egyptians used fans made of ostrich feathers; in India the feathers were from the peacock; in China, fans were sawed out of ivory nearly a thousand years B. C., the works being within the palace at Pekin. Oriental fans had beautiful handles of gold and silver filigree, enamel, tortoise shell, and mother-of-pearl.

Spanish women have been noted for their coquettish use of the fan which is made by them to speak a sort of sign language. The Spanish fan may vary from an exceedingly small to a very large size. The North American Indians use fans made of eagles' feathers.

Mesh Bags

Mesh bags are made of small interlacing rings cut

Courtesy of International Studio

Figure 7. Design for Lace Fan

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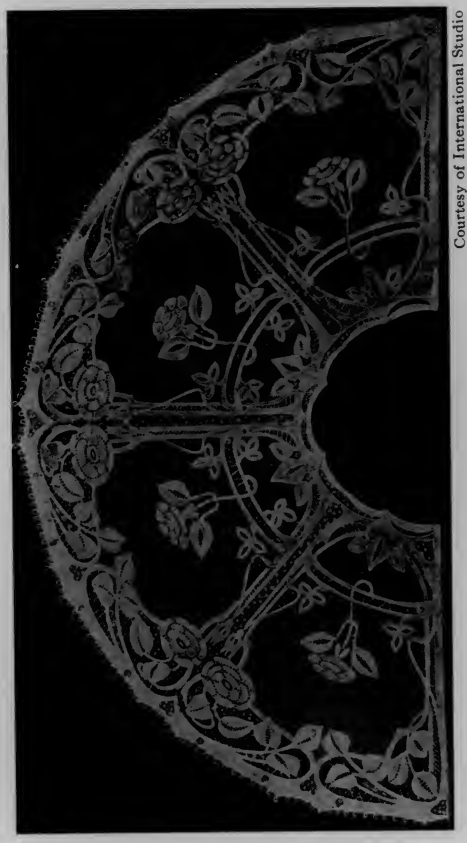


Courtesy of International Studio

Figure 7. Design for Lace Fan

from fine wire. They may be of solid or plated gold or silver, gunmetal, or German silver.

The rings are made by wrapping the wire around a mandrel. When the spiral formed in this way is cut lengthwise it falls into tiny rings open on one side. These rings were formerly put together by hand and in the best bags soldered by hand. This made mesh bags very expensive.

A machine has recently been invented which interlaces and presses the rings together. The heavier wire is soldered but finer meshes do not require anything but that the ends of the rings shall touch. Gold and silver bags are now made with an exceedingly fine mesh in which the rings are hardly perceptible.

Ornamental Tops

The ornamental tops of the bags are made of hand-wrought metal, or stamped out by machinery according to the grade of the article. A gold bag may have the clasp studded with jewels and enriched with enamels. For the luxurious they are even made with fringes of precious stones. Some mesh bags are drawn up with a chain.

Leather, silk, and velvet bags are also made with clasps of gold and silver, but the precious metal is usually plated or filled, not only to lessen the cost but to make it stronger.

Bead Bags

Bead bags are a revival of a fashion popular in the early part of the nineteenth century. The bags which some are fortunate enough to have handed down to them are so exquisitely made and of such fine beads that they cannot be duplicated today.

The beads for this purpose are of glass, pottery, or steel. Glass beads are made in a multitude of tints and shades which are combined in very elaborate designs. These bags are made in three ways:

1. A canvas foundation is stamped with the pattern which is then worked as in embroidery. Each bead is sewed on separately and the bag is afterward put in water and shrunk in order to tighten up the beads.
2. The beads are strung on heavy silk thread which is crocheted or knitted into the bag.
3. The bags may be woven on bead looms.

The French make a specialty of bags which are of very fine beads and beautifully made.

Bags made of steel beads are sometimes solid but more often have bands of beads or bead embroidery on a crocheted silk foundation.

Bead bags may have a metal clasp or be drawn up with a draw string. The latter have a tassel to finish the lower end and may have a ruffle of silk above the top. Bags of this type can be made by machine but the difference between such bags and handmade ones is very apparent.

Chapter XIX

COMBS AND HAIR ORNAMENTS

Types

Combs and barrettes are used to ornament the hair as well as to hold it in place. They may be classed as:

1. Back-combs
2. Side-combs
3. Ornamental hairpins
4. Bandeaux
5. Barrettes

Hair ornaments and combs are made of tortoise shell, amber, jet, silver, silverite (a composition metal), celluloid, and hard rubber. They may be ornamented with gold, silver, enamel, precious stones, and imitation stones. They are made in many shapes and sizes and form a large division of the Jewelry Department materials. The styles vary with the prevailing fashion for dressing the hair.

Tortoise Shell

Real or imitation tortoise shell is the most approved material for the foundation of all hair ornaments.

Tortoise shell is composed of the scales or outer shell of the hawksbill turtle which grows to a very large size. The color is brown or amber, more or less mottled or clouded. Clear amber shells are the most valuable and the red brown comes next. The dark brown shells sell for less than half the price of the amber. After the plates have been removed from the turtle's back the animal is put back in the water.

The best tortoise shell is found in the Indian Ocean but the center of the tortoise shell industry is Naples, Italy. There and in some other Italian towns the shells are scraped with knives and files and polished with olive oil or rottenstone. The scales are then softened by boiling them in oil or water and molded into shape. They may be welded together after being boiled, by the pressure of hot irons.

Tortoise shell has been used for ornamental purposes for many centuries.

Tortoise shell may be imitated in horn or celluloid, but the imitations lack the brilliant polish and clear color of the real shell.

Amber

See Chapter IX, "Description of Stones," for a description of amber. Amber combs are very effective and beautiful for golden hair.

Jet

Jet is a form of dense coal, tougher and more compact than common coal, which can be carved and polished. It is also called black amber because it produces electricity when rubbed. The softer kinds are sometimes called bastard jet. The finest varieties of jet come from Whitby, England. Some of it is mined but at times it is washed up on the shore near Whitby. Jet is also found in Spain but it is not so lustrous or so durable. Spanish jet contains sulphur which is affected by extreme heat and cold and will chip and break.

Rough jet is covered with a hard blue or brown shell which must be removed with a large chisel. The block is then sawed into pieces of the required size. These are shaped on a grindstone, and the surfaces ground, after which they are ready to be carved. Beads, heads of hat pins, etc., are made from the smaller pieces, although Spanish jet is more commonly used for such articles.

Jet is spoken of in old Saxon poetry and was used for beads, buttons, and other kinds of jewelry before the Romans conquered Britain. It was used for rosaries by the priests of Whitby Abbey probably as early as the fourteenth century, and in 1598 there was a regular trade in jet.

Horn

Horn, as its name implies, comes from the horns of the ox, buffalo, sheep, and goat. It may resemble tortoise shell and is used as a substitute for it, but it is less brilliant and more brittle so that it cannot be carved. Horn has streaks of color and mottled spots which are often beautiful in their shading.

Celluloid

Celluloid is composed of vegetable fiber, cellulose, which has been treated with acids, camphor, and other substances until it has become plastic and capable of being molded into permanent forms. While it is still soft it may be colored to imitate ivory, amber, shell, horn, or even pearl.

For imitation tortoise shell, the mass is dyed a light yellowish-brown and then sprayed with color in spots, or thin sheets of different colors are passed under heated rolls which blend them together. Sometimes it is colored by hand.

For amber, yellow dyestuff is dissolved in the solution of camphor used in the process. Translucent or opaque patches of natural color are imitated by rolling small pieces of the deeper colored material with the amber-colored sheets.

The effect of horn is given by building up layers of celluloid sheets having spots, colors, and lines in them, and by heat and pressure combining them into a variegated mass which can then be carved or molded.

Manufacture of Combs

Like all other processes, that of making combs, cutting the teeth, welding the parts together, and decorating them, was originally done by hand. The first machine for making combs was invented in 1798. The teeth were then cut by a fine saw, but in 1814 a machine was invented to cut combs at one operation. Some machinery is so delicate that it will cut one hundred teeth to an inch.

The tops of tortoise shell and amber combs and barrettes are often beautifully carved. This is especially the case when large Spanish combs are in fashion. Celluloid is pressed to look like carving. Gold, rhinestones, and silver filigree and enamel are also used but rhinestones are the most popular decorations because of their brilliance which is shown to the greatest advantage against dark hair. Cut steel is less brilliant though it also makes a glittering decoration.

Because of their plastic material, combs of all these materials can be mended by welding the pieces together under heat and pressure.

History

Combs made of boxwood were used among the Egyptians. The ancient wooden combs shown in

Figure 8. Primitive Wooden Combs
(Courtesy of International Studio)

Figure 8 are illustrations of this type. Roman ladies plaited and crimped their hair and filled it with ornaments. During the Middle Ages combs were made of ivory, precious metals, and horn handsomely carved and decorated with jewels. In Spain and Mexico the comb is the most elaborate ornament of women. These combs are very large and costly as they are carved in the most exquisite lacelike filigree. The first factory in the United States for the making of horn combs was opened at West Newbury, Mass., in 1759.

Chapter XX

HISTORY OF JEWELRY

Jewelry Among Savage Tribes

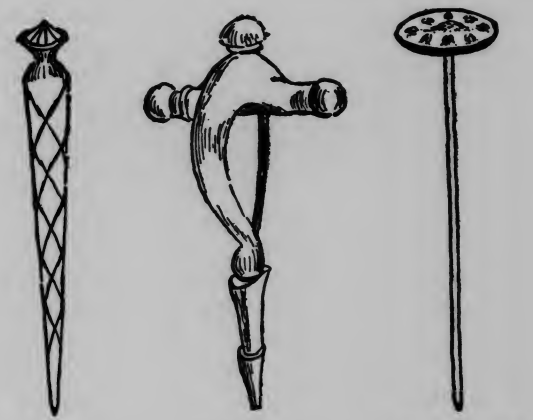
One of the first signs that men have developed a sense of beauty is their desire for decoration. Even the lowest groups of savages paint their bodies and wear strings of beads, stones, or other ornaments. Their tools may be very crude and their clothing scanty, but they find some way of making themselves attractive in their own eyes. Early metal workers were largely engaged in making ornaments as well as useful articles, and these ornaments were usually worn by men rather than by women.

In Ancient History

We cannot read any accounts of the life of ancient people without finding descriptions of their jewelry, and when buried treasures are dug up from the ruins of ancient cities the remnants of jewelry are among the most frequent discoveries.

Egyptian jewelers had attained a high degree of skill in the handling of the precious metals and in carving

precious stones. All oriental countries have paid much attention to jewelry. Oriental beauties are loaded with



Irish Pin Graeco-Roman Egyptian Hairpin

Figure 9. Ancient Pins

rings, bracelets, chains, and ankle ornaments. Greek jewelry was as perfect in form and proportion as other ornaments. The Greeks excelled in embossing, engraving, and filigree work. Roman jewelry was heavier, with less grace and more magnificence. The pins in Figure 9 illustrate the characteristics of jewelry of these various periods.

The peasants of European countries have kept the old types of silver and gold jewelry which have been handed down for many generations and are often very quaint and of fine workmanship, though much of it is rather monotonous, because of the repetition of a few traditional designs.

Renaissance jewelry was very gorgeous and elaborately ornamented with enamel and precious stones. It was often worked up in symbolic designs of large size and many parts.

Centers of Modern Industry

London and Paris have been the centers of jewelry manufacture, but large amounts of cheap jewelry are now made in various parts of England, France, and Germany. Garnet jewelry is made at Prague, filigree work and mosaics at Florence, Venice, and Rome, while tortoise shell jewelry is made in Naples, Rome, and Florence. Holland has been the center of the diamond-cutting industry, but diamonds are now cut in America. A large part of the solid and plated jewelry used in this country is manufactured here, the center of the industry being the New England States.

History of American Jewelry

The use of jewelry was not approved by our Puritan forefathers, and gold and silversmiths were only allowed to make belt buckles and shoe buckles for men and wedding rings and simple brooches for women. Today Massachusetts, Rhode Island, and Connecticut make a large percentage of the jewelry and ornamental silverware for the entire country.

Nehemiah Dodge was the pioneer among American jewelers. He began to manufacture jewelry in 1794, at first making ornaments from 18 karat gold. Later he introduced rolled plate by which he soldered a thin sheet of gold on a thicker sheet of copper and then hammered and rolled the combined sheet still thinner.

He was able to reduce the cost of manufacture and therefore began to sell jewelry to other goldsmiths, becoming the first manufacturing jeweler. Out of this enterprise grew the great jewelry industry, centering in Providence, R. I., and in Attleboro, Mass. Jabez Gorham, the founder of the Gorham Company, was apprenticed to Dodge.

In 1821 filigree jewelry was introduced by a Frenchman. In 1846 Thomas H. Lane, who came to Providence from Birmingham, England, began to make rolled plate by sweating the thin sheet on the base metal instead of soldering it on. This method was simpler, better, and more economical than the soldering process.

The discovery of gold in California added a strong impetus to the manufacture of jewelry. The Civil

War checked it for a time, but it has had a steady growth for the past forty years.

History of Various Articles

The history of different articles of jewelry is most interesting as it is connected with religious and social customs and political history.

Brooches and pins were necessary for holding garments together, as they were used before buttons. The brooch is merely an ornamented safety pin, while the more simple stick-pin is only a development from the thorn, which savages used for holding things together.

Rings are among the most ancient ornaments, often having a religious or mystical meaning. Signet or seal rings are of oriental origin, but were also used by the Romans to seal documents. Engagement or betrothal rings were originally large and curiously wrought. The custom of wearing them on the third finger of the left hand is supposed to have originated in the belief that a vein ran from that finger directly to the heart. They were only worn at the ceremony and then kept as mementos. Wedding rings were also highly decorated. They are of very ancient origin. The use of wedding rings was considered a pagan custom, and was not adopted by Christians until about 860 A. D.

Chains of massive links were worn by kings and

nobles until a comparatively recent period. They were considered one of the badges of rank. Bracelets and ankle ornaments have always been worn in profusion by women in oriental countries. At one time a broad band of gold worn on the upper part of the arm was considered a suitable ornament for men.

The use of elaborate jewelry is no longer considered good form for men and jewelry for women is tending more toward artistic and dainty designs rather than great display; but the love of beautiful ornaments of gold and precious stones seems to be a permanent instinct that will always make jewelry a field for the artist and manufacturer.

Chapter XXI

BIRTHSTONES

Origin

The term birthstone or natal stone is given to the precious stone which is popularly assigned to the month in which one is born. The custom of associating certain gems with certain months of the year is of very ancient origin, but the custom of wearing the stone belonging to the month of one's birth has only developed during the last few centuries.

The Romans had many traditions about precious stones and in each month one or more stones were supposed to have peculiar power, especially in warding off disease or danger.

Early in the Christian era these traditions began to be effective. The stones selected for the months did not exactly follow the Roman order, but were almost identical with the order of the twelve stones in the breastplate of the Jewish high priest and the stones of the New Jerusalem. The changes in the lists were probably due to changes in the names of the stones or uncertainty as to the stone referred to.

The Original List

The following list of natal stones is given by so eminent an authority as Mr. George Frederick Kunz as the one believed in for the past five hundred years:

January	Garnet	July	Turquoise
February	Amethyst		Onyx
	Hyacinth	August	Sardonyx
	Pearl		Carnelian
March	Jasper		Moonstone
	Bloodstone		Topaz
April	Diamond	September	Chrysolite
	Sapphire	October	Beryl
May	Emerald		Opal
	Agate	November	Topaz
June	Cat's Eye		Pearl
	Turquoise	December	Ruby
	Agate		Bloodstone

The New List

The National Association of Jewelers which met in Kansas City in August, 1913, adopted a list of birthstones in which they made certain important changes as follows:

January	Garnet	March	Aquamarine
February	Amethyst	April	Diamond
March	Bloodstone	May	Emerald

June	Pearl	October	Opal
	Moonstone		Tourmaline
July	Ruby	November	Topaz
August	Sardonyx	December	Turquoise
	Peridot		Lapis Lazuli
September	Sapphire		

Nearly all the months have at least one of the traditional stones still associated with it, but as the whole subject is one of sentiment rather than convenience it seems strange that any arbitrary changes should have been made, especially such drastic ones as the transfer of the turquoise from June and July to December and of the ruby from December to July.

In suggesting birthstones to customers salespeople should know the real traditions concerning them as many people would prefer the fiery ruby to the cold turquoise for a December birthday, and in any case would prefer to follow the traditional custom.

Chapter XXII

SUGGESTIONS TO SALESPEOPLE AND CUSTOMERS

Arrangement, Display, and Care of Stock

No department of the store will repay careful arrangement and display so well as that containing jewelry, as not only the individual pieces but the beauty of the whole is the basis of appeal to the customer.

Arrangement should include suitable backgrounds (black or purple velvet is best for gold; silver-gray or sapphire-blue for platinum), careful lighting, and combinations which will enhance rather than lessen the artistic effect of individual beauty.

Jewelry should be kept free from dust which not only detracts from its appearance but scratches the polished surfaces. In addition to a jewelry brush the salesperson should always have chamois or selvyt and soft canton flannel for wiping the articles after they have been handled.

The salesperson's hands should always be kept clean and dry and articles should be handled by their edges so far as possible. All moisture should be immediately removed as it injures the finish.

Lockets, vanity cases, and other articles which close with clasps or snaps should be opened and cleaned on the inside to prevent the accumulation of dust and moisture. The hinges or springs should be given special attention.

Some materials and finishes are unusually perishable and should be given special care. Roman gold must not be rubbed but wiped carefully. Gun-metal will rust and therefore must be kept free from all moisture.

Enamel is scratched by polishing powders and care must be taken when rubbing up enameled jewelry. Jet is very perishable and must be handled carefully to prevent chipping.

Materials

A knowledge of the relative values and characteristics of gold and platinum will help to make good sales. Some "pure" gold is sold which contains so much copper that it will leave a greenish stain on the skin in hot weather. This explanation may be made so that the customer will not think she has been cheated.

Precious stones are so interesting that almost every customer will gladly receive information with regard to their colors, relative values, most effective placement, etc.

The difference between synthetic stones and imitation stones should be clearly in a salesperson's mind as

the first are real stones, though not so valuable as naturally formed ones.

Manufacture

Since the making of jewelry is one of the fine arts, a knowledge of the hand work involved, and of the way in which designs are built up, especially a knowledge of the principles of design as shown in metal work, can give a salesperson most effective and legitimate selling points.

Customers usually know very little of enameling or how cameos and intaglios are made. They will be interested in comparing the goldsmith's method with the coppersmith's.

Practical questions as to durability and suitability may be also answered from a knowledge of manufacture.

The advantages of soldered links over those which are merely pressed together, different types of clasps and hinges, and the strength and security of each should be known and explained. Stone cutting and setting are not less important.

History

Many telling points can be made if one is familiar with the history and customs regarding jewelry. Nearly every precious stone and every kind of ornament has its romantic or practical story; sometimes

they have both. The symbolism of precious stones often appeals to the sentiment of the customer. Scarabs may remind one of the Egyptians, cameos of the Roman emperors, or perhaps of Queen Elizabeth.

The life of the coral builder, and the way in which the color varies under different conditions, is another absorbing story.

The saleswoman will not always have a chance to go into these things, but the choice of an ornament or jewel is usually made with some care, and if one is personally interested and full of the subject some little remark may be made which holds the attention of the customer. A longer story will depend on circumstances, but the customer always wants to be waited on by "one who knows."

Suitability

Jewelry is very often purchased for gifts. Probably a very large percentage of all such ornaments is not intended for the use of the purchaser, but for some one else. Customers are therefore peculiarly dependent on the judgment of the salesperson, because they are trying to satisfy another person's taste and wishes. The mischoice of gifts is shown by the number that come back after Christmas, and many more would come back if the recipient had the courage to return them!

It is not possible to know the peculiar tastes of people whom we have never seen, but care and good sense would prevent many an utterly inappropriate one such as a highly ornamented shoe horn for a young baby, a vanity case for a child of six, or gold beads for an old lady. Yet such gifts have been made many times.

The salesperson may very properly inquire as to whether the one for whom the gift is intended is young or old, the favorite color, and perhaps the color of hair and eyes. Turquoises are more likely to be worn by blondes and topazes by brunettes.

Many people now adopt their birthstones, and salespeople should know the stone or stones for each month, especially if it is to be a birthday present. If advice as to design or style is asked, a conservative opinion should be given. It is unsafe to suggest the latest novelty unless it is for a young girl, as good jewelry is a permanent possession and novelties lose their interest. In cheaper jewelry novelties are very acceptable.

Gifts for special occasions acquire an added value when they have some relation to it. Friendship brooches or bracelets are appropriate for bridesmaids or girl graduates; pendants as the groom's gift to the bride.

Wedding rings are now not always the plain circlet of gold, but are often carved with orange blossoms or

other symbolic devices. It is becoming customary for the bride and groom to wear matched rings.

Mourning jewelry has its own conventions. The amethyst, and diamonds set in black onyx, or with black enamel and platinum or gun-metal are appropriate.

For people who "have everything," but are to receive one thing more the salesperson should be well informed as to artistic and unusual things, both in the better and the less expensive grades. Under these circumstances the novelty is appropriate, especially if it suggests a new convenience or satisfies an undiscovered want.

Jewelry for men should be distinctive and handsome rather than dainty. The Japanese have been very successful in giving jewelry the masculine touch. Men wish "correct form" in dress more than artistic effect, as a rule, and a salesperson should keep in touch with the best in current fashions.

Style in jewelry is always affected by style in dress and it is well to watch the style movement as shown in shop windows or on the street as well as in the goods which come into the department.

Suggestions as to jewelry appropriate for morning, afternoon, or evening wear will often help to define the purchaser's idea of the ornament desired. Jewelry for morning or street wear should be simple and rather

severe. For afternoon it may be more ornate, while for evening dress there is no limitation except the personal taste of the wearer. Sparkling stones like the diamond are more beautiful under artificial light, as well as more appropriate for the evening.

Care

Suggestions as to the care of precious stones are very gratefully received. The following are important:

Pearls should never be put in hot water and soap or chemicals, which will dissolve them. They must always be handled carefully, as they are soft and easily scratched. Their beauty is permanently affected by ink, grease, or perspiration, and they will actually dissolve in acids. Extreme heat will ruin them. Pearls should be wiped with a soft cloth after being worn or exposed and should be kept wrapped in a tightly closed box or casket.

The same rules apply to opals, moonstones, and turquoises.

Turquoises should not be put in water as they lose their beautiful color.

Extreme heat affects the color and texture of nearly all gems, the harder ones being less injured than soft stones.

Light oxidizes the softer stones and causes them

to fade. Dirt and grease scratch them. Acids will change their color.

Pearls and opals, which are rather soft stones, must be carefully set, so that the claws will not cut into them.

Jewelry should be kept scrupulously clean and should be frequently taken back to the jeweler for cleaning as well as for examination of settings and clasps. Pearls need to be restrung once in three months as they wear upon each other and upon the string.

Chapter XXIII

CLASSIFICATION OF STOCK OF A TYPICAL JEWELRY DEPARTMENT

DIVISIONS

A. Jewelry (Gold and Platinum; Plated and Novelty)
B. Fans and Fancy Bags
C. Combs and Hair Ornaments
D. Toilet Articles

A — JEWELRY

1. Articles

(a) Rings
- Wedding
- Seal or Signet
- Solitaire
- Two, Three, and Five Stones
- Cluster
- Filigree
- Cameo

(b) Pins
- Scarf
- Brooch
- Bar

Lingerie
Spot

(c) Chains
Watch
Lorgnette or Fan

(d) Necklaces
Pearl
Bead
Dog Collars
Lavaliere
Sautoir
Festoons

(e) Pendants
Lockets
Crosses
Lavaliere

(f) Bracelets
Clasp
Bangle
Flexible

(g) Men's Jewelry
Rings
Pins
Chains
Cuff Buttons and Links
Studs
Collar Buttons
Tie Clasps
Dress Sets
Belts and Belt Buckles

2. Materials

(a) Metals
Platinum

Gold
Silver
Gun-Metal
Copper
Nickel

(b) Stones
Precious
Synthetic and Reconstructed
Imitation

(c) Enamel
(d) Ivory
(e) Mother-of-Pearl
(f) Coral
(g) Amber
(h) Jet

3. Manufacture

(a) Metals, Combined or Pure
Platinum
Gold and Platinum
Solid Gold
Gold-Filled
Gold-Plated
Sterling Silver
Silver-Plated
Silverite (Composition)
Silver and Copper
Copper and Brass
Gun-Metal

(b) Methods
Distinctive from Special Designs
Jewelry "Sets" Finished by Hand
Commercial Jewelry

(c) Styles
Filigree

Repoussé
Modeling
Engraving
Carving
Enameling
Niello
Inlaying
Stone Setting
Cameo Cutting

B — Fans and Fancy Bags

1. Fans

(a) Types
Rigid
Folding
Collapsible

(b) Materials
Gauze
Parchment
Feather
Paper
Celluloid
Tortoise Shell
Ivory
Mother-of-Pearl
Lace (Real and Imitation)
Princess
Duchess
Spider Web
Point Appliqué
Carick-ma-Cross
Venise
Rose Point
Renaissance

(c) Decoration
Lace
Painting
Printing
Embroidery
Feathers
Carving
Inlay

2. Bags

(a) Kinds
Mesh
Bead
Crochet
Silk and Velvet
Leather

(b) Materials
Gold
Silver
Gun-Metal
Steel
Brass
White Metal
Silk
Velvet
Velveteen
Linen
Leather

(c) Decoration
Beads
Embroidery
Lace
Engraving
Studding with Stones
Enamel
Filigree

C — Combs and Hair Ornaments

1. Kinds
   - Side
   - Back
   - Barrettes
   - Bandeaux
   - Tiaras
   - Hairpins
2. Materials
   - Tortoise Shell
   - Celluloid
   - Aluminum
   - Silverette (Composition)
   - Amber
   - Jet
3. Decoration
   - Pressed
   - Carved
   - Studded
     - Rhinestones
     - Bohemian Garnets
     - Imitation Stones
   - Gold Inlaid
   - Aluminum
   - Gold Bands
   - Crystal or Claire
   - Cut Steel
4. Colors
   - Shell
   - Amber
   - Black
   - Gray

Part V—Silverware and Ornaments

Chapter XXIV

THE SILVERWARE DEPARTMENT

The Silversmith

The silversmith and the goldsmith have much in common as fine metal workers. The crafts are similar but the silversmith's work is on a larger scale and he makes a different type of ware. Silver is as much the distinctive metal for fine tableware as gold is for jewelry.

Silverwork has lost much of its distinction in the change from handwork to machine and factory processes, but the hand-wrought silver is still regarded as worth its greater cost even as handmade gold or platinum jewelry is often valued for its workmanship even more than for its valuable materials.

Craftsmen skilled in the making of silverware are very rare in the United States. We have no craft schools in this country which are capable of training silversmiths, and all hand-wrought silver must be made by the small number of true craftsmen who have come

from Europe. Colonial silversmiths like Paul Revere made their ware by hand, but the standards of our forefathers are not good enough to please modern buyers, and the spirit of craftsmanship is gone.

Colonial silver was simple in design and often crude in workmanship, that is, it was not mechanically perfect even where it was beautiful in shape and pattern. We are willing to sacrifice beauty to perfection in manufacture but for the fortunate few both are possible.

Divisions of Department

The divisions of the Silverware Department are:

Sterling hollow-ware
Sterling flat-ware
Plated hollow-ware
Plated flat-ware
Toilet articles

Hollow-ware includes plates and platters as well as deeper dishes, while flat-ware is the term applied to knives, forks, spoons, and small pieces of that type.

Hand-Wrought Hollow-Ware

The finest hollow-ware is hand-wrought. The graceful shapes are raised from flat silver with only the use of hand-tools, even the hinges being handmade.

Anyone who has seen a deep dish lined with pie

crust knows how the ball of dough is rolled and stretched until it takes the shape of the dish without wrinkling or overlapping. The malleable metals are treated in the same way, but because of their greater stiffness they are harder to manipulate and will keep the shape into which they are forced.

The process of making hollow-ware from flat metal is called "raising." To raise a shallow dish the metal needs only to be placed on a block of wood which has been hollowed out in the middle and then to be beaten down with repeated blows of a smooth steel hammer until it takes the shape required. Deep vessels are first "wrinkled," or turned up on all sides in a series of scallops without attempting to stretch the metal. Then the wrinkles are slowly beaten down and smoothed out, the metal stretching upward as the piece is held on a steel stake and hammered from the outside. By hammering above the place where the stake is held against a vessel it can be made narrower at the top.

Special Tools

For teapots, pitchers, and other pieces which swell out in certain sections, special tools are required.

A *bellying hammer* is one of these. It is curved in such a way that it can strike from the inside wherever it is necessary to push out some part of the vessel.

A *snarling iron* works in a different way. It is a

tool with its two ends bent in opposite directions. One end is held in a vise and the other end put inside the pitcher or teapot. When the iron is struck at a point about two inches from the vise it springs back and the other end jumps and gives the vessel a blow.

For "necking in," or making the curve around the necks of bowls or pitchers, a *tee stake* is used. This stake has a curved end which is placed in the vessel against the side while the hammer strikes beyond it, as in narrowing.

The lips of pitchers are formed over wooden stakes in which there are depressions of the required shape.

Covers and Mounts

The lid of a tea or coffee pot is made separately, and the hinge is cut from a heavier sheet. It is sawed out, shaped, and soldered on. The handle and spout are each made in one piece, which is curled over until the edges meet, seamed up, shaped, and attached with silver solder, or, if the handle is of wood, the sockets for it are soldered on.

The teapot cover rests on a bezel of silver wire soldered onto the lip near the top. Sometimes the cover is strengthened by another silver wire just inside the edge.

For a "ring foot" a heavy wire is soldered around the bottom of the body. Mounts, such as legs or balls,

may be soldered on in the same way or the bottom may be left flat. Pieces are often made with a base or standard which curves outward from beneath the body. If there is a sharp line or ring at the place where the outward curve begins, it has evidently been soldered on and is another form of mount, but sometimes it curves out gradually.

In order to make a base with a gradual outward curve from the body, the piece is raised to its approximate shape and the bottom is cut off, or opened. The base is then "necked in" and a new bottom is soldered on at the narrowest part.

When handles, spouts, bottoms, or mounts of any kind are put on in this way they are hammered and smoothed down until they become a part of the body, as the hard silver solder is of practically the same material as the rest of the metal.[1]

Hammer Marks

The marks of the hammer may be seen on the inside of handmade silver and in some cases show on the surface, but they are small and uneven. Hammer marks are also made with a hammer and prong on an inferior grade of silver, but they can be detected by their regularity and the fact that they are made on the surface.

Hammer marks are usually planished from the sur-

[1] Hard silver solder is two-thirds silver and one-third copper and zinc.

face with bright steel hammers, which not only smooth the metal but harden and toughen it.

Polishing

Silver is burnished with oil and emery or pumice-stone and rouge. Colonial silver was polished without removing the fire scale, which is usually taken off of modern silverware by dipping it in acid. On some hand-wrought silver, especially of the *Martelé* type, the fire scale is allowed to remain, or if it is broken during the processes of manufacture the piece is again heated until the scale forms. It is then buffed and polished carefully to give it a beautiful dull luster instead of the familiar bright finish.

Commercial Hollow-Ware

Hand-wrought pieces are necessarily costly. In order to make articles on a commercial scale, silversmiths must be able to reproduce them by less laborious methods. The reproductions are less exclusive, but almost as beautiful and quite as durable as the originals.

Use of Dies

Commercial hollow-ware is also raised from the flat silver, but the raising is done with steel dies which exactly conform to the shape of the model. If the

piece is undercut, as on a teapot or any article which has a neck or outcurving base, it must be made in two or more sections and the parts soldered together. Designs are so made that the places for soldering occur along an edge or are covered by a silver wire or some kind of decoration by which the joint is invisible. It is interesting to study silverware with a knowledge of this necessity.

Several blows of a stamping die are needed to raise the form from the flat sheet. It is the same principle as the hammering, but much more force may be used because all parts of the metal are struck at one time and the strain is distributed. Plates or salvers and shallow dishes are stamped out in this way. Deeper articles of hollow-ware are stamped if there is "motion" in them, that is, if they have fluting or chasing, or if the shape is irregular.

Drawing and Spinning

If they are rounded or oval-shaped they are "drawn" by a hydraulic die and then "spun." A drawing die stretches the metal by pulling and pushing, instead of pounding. It exerts a much greater pressure than a stamping die, but the pressure is steady instead of being given by repeated blows. (For description of dies, see "Housefurnishings Manual.")

When a vessel is taken from the drawing die it has

not its final form, but must be placed on a "chuck" attached to a wheel which turns rapidly round and round while the workman molds the metal to the desired form by the pressure of steel tools. The chuck is composed of a number of pieces held together by a central pin. When this central piece is drawn out the others fall apart and can be removed even if the neck of the piece is smaller than its body. Formerly only round articles could be spun, but the machine is now given a swaying motion by which oval shapes can be made. Spinning imparts a mellow texture to the ware, but it requires expert craftsmen, while stamping is a mechanical process.

Finishing Process

Handles, spouts, bezels, legs, and other mounts must be put on in the same way as in hand-wrought silver, and the planishing and finishing are done in the same way. The planishing of platters and salvers is so difficult that it is only given to expert workmen. Certain articles, such as cream pitchers, are gold-lined. For fine work this is done with silver gilt. (See Chapter XXV.)

Sterling Flat-Ware—Hand Process

Handmade spoons are either sawn out of the flat metal and finished with a hammer, forged from a bar

of silver, or made in two pieces and soldered together.

1. For the first method the spoon is cut in a shape nearly like the finished spoon, but shorter, narrower, and thicker. The bowl is hammered out wider on an anvil, then the shank is hammered on the side to make it thicker and narrower, and the top of the handle hammered flat like the bowl.

2. For a forged spoon the silver bar is heated and hammered into a rough shape, then trimmed and polished.

3. When the bowl and handle are made separately the sheet from which the bowl is cut is thinner than that for the handle. They are hammered to shape with the top of the shank flattened out. This is soldered to the bottom of the bowl and the spoon is then planished to harden it.

Old silver spoons often show where the handle was soldered on. The forged spoon is the strongest, but the soldered spoon is also strong at the base of the bowl where there is the greatest strain.

Handmade forks are made from a thicker sheet of silver than spoons. The tines must be sawed out and then shaped and pointed with the hammer. The handles are shaped in the same way as those of spoons, with the shank beaten in on the side to make it stronger.

Butter and cheese knives, with the blade pounded

flat, are sometimes made in one piece from a bar of silver. All other knives require an electroplated or steel blade and are therefore made in two sections. The blade is made with its base ending in a prong and the handle is hollowed out to admit it. Usually the handle is hollow for its entire length, being made of sheet silver seamed up on one side. When the prong of the blade is inserted in the handle, cement is poured in to secure it and, if the handle is hollow, to give it weight and solidity.

Fancy knives, forks, and spoons are cut and hammered out with variations of the simpler methods.

Figure 10 shows various steps in the making of a spoon by the hand-wrought process.

Sterling Flat-Ware—Commercial Process

For commercial silver these earlier processes are carried out by machines. The "blank" is first cut out shorter and thicker than the finished fork or spoon is to be. It is then squeezed to make the shank thicker, rolled or "graded," to distribute the metal properly, and clipped with a die which gives it the outline of spoon or fork. After annealing the metal to make it more malleable, the bowl is stretched or the tines pointed and the handle compressed and flattened in the necessary places. If there is a raised pattern it is "struck out" at this time by the steel die.

Courtesy of Towle Mfg. Co.

Figure 10. Steps in the Development of a Hand-Wrought Spoon

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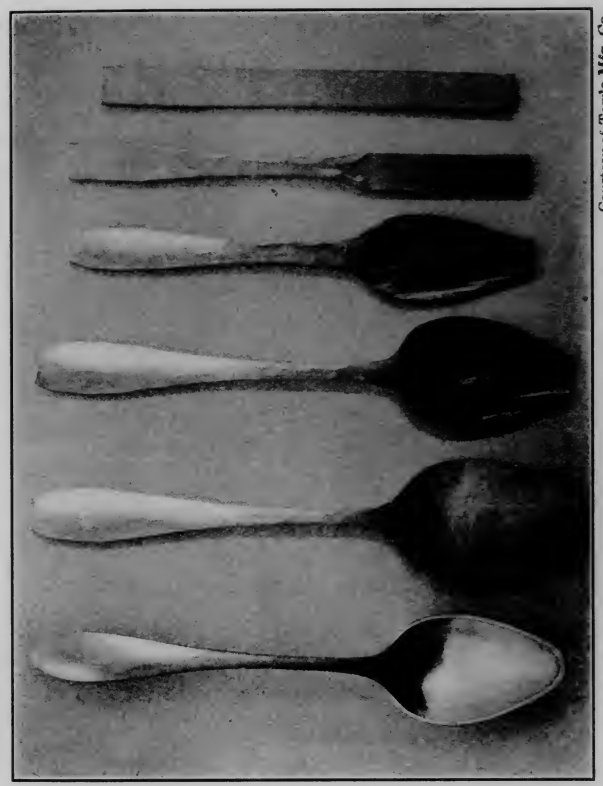

Courtesy of Towle Mfg. Co.

Figure 10. Steps in the Development of a Hand-Wrought Spoon

Piercing is also done by machine but engraving must be done by hand.

Silver is polished with oil and emery, pumicestone, or tripoli and finally burnished with jeweler's rouge.

Figure 11 shows the steps in making a machine-wrought spoon.

Plated Ware

Modern silver-plated ware is all electroplated (see page 77). Rolled copper, or Sheffield, plate is only to be found in old silver. An imitation of Sheffield is made of silver electroplated on copper, but the best base metal for this purpose is nickel silver composed of nickel, copper, and zinc.

Both hollow-ware and flat-ware are made by methods similar to those used for sterling silverware, but there are many grades of workmanship, design, and finish. As nickel silver, or white metal, is harder and less malleable than silver, it cannot be drawn or spun but must be stamped out, and while it can be beaten out after being heated, it lacks the texture and the sharp outlines of any raised patterns on the softer metal.

The plating depends upon the length of time that the article remains in the solution. "Triple plate" is the name for a certain thickness of the silver deposit. Quadruple and quintuple plate are heavier in proportion to the surface to be covered. Reinforced, or

relaid, silver has some of the base metal removed in places which receive the hardest wear and the place filled in with silver.

Plated Ware Versus Sterling Silver

Good plated ware of standard design and well made will last for years and is more satisfactory than thin sterling silver which is easily bent and broken. Inferior plated ware is not worth purchasing; the coating of silver is so thin that it lasts a very short time and the designs are ugly or badly executed. In hollowware soft solder is used where hard silver solder is needed and soon breaks at an important joint. So long as people will buy such "cheap and nasty" goods they will be made, but they only add to the wasteful extravagance of the purchaser and ruin the taste of everyone who must handle them either in factory or store.

Silverware is one of the refinements of living which adds much to our artistic satisfaction when it is beautiful, but in cheap imitations there is far less attraction than in earthenware, aluminum, or steel.

Toilet Articles

Silver toilet articles may be grouped in four classes:

Courtesy of Towle Mfg. Co.

Figure 11. Steps in the Development of a Machine-Wrought Spoon

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Figure 11. Steps in the Development of a Machine-Wrought Spoon

Brushes, combs, and mirrors
Manicure articles
Bottles, boxes, jars, and trays
Miscellaneous equipment and sets

The making of brushes, combs, and mirrors is described in other manuals. (See Index.) The silver backs are of sheet silver or plated on nickel silver. Sterling silver backs for brushes and mirrors have filled handles, not only to lessen the cost but to reduce the weight. Unless the handles are small and thin they would be uncomfortably heavy if made of a solid piece of silver. They are therefore made hollow and seamed up on the sides, the top of the brush and the back being in one piece and the under side of the handle being soldered on afterward. The brush or mirror is set in the opening provided for it and the bezel turned down over the edge.

The shaped piece of silver for the comb is fitted over the top and soldered or riveted on, but some sets are made with tortoise shell or ivory dressing combs, because the silver is apt to loosen at the edge and catch the hair. The silver on some sterling sets is so thin that the pieces break at the point where the handle meets the brush or mirror. These are less serviceable than good plated ware.

Toilet articles are also made in silver, enameled with

transparent enamels with beautiful engraved patterns beneath the surface. Real ivory and tortoise shell, as well as gold, are used in toilet sets for the luxurious. "French ivory," "Pyralin," and other names, are given to a preparation of celluloid which makes an excellent imitation of ivory. Celluloid is also used to imitate amber and tortoise shell (see page 144).

Manicure sets are described in the manual on leather goods. The silver mountings on these smaller articles are sometimes solid metal, but often filled and may be very thin and weak.

Shoe horns, button hooks, scissors, and files are of steel mounted in silver or shoe horns may be of celluloid.

Bottles are made of silver deposit glass or are mounted in silver. Silver deposit is described in the "Glassware Manual."

Boxes, jars, and trays of all kinds and varying in beauty and value from little pin trays to elaborate boxes for jewels may be found in this department with silver smoking or lavatory sets, thermometers, cane and umbrella handles, and other articles bearing no relation to each other but all made of silver.

Silver Ornaments

See page 221 for discussion of silver ornaments.

Chapter XXV

SHEFFIELD PLATE

Rolled Silver Plate

Rolled silver plate is called "Sheffield" plate from the place in which it originated and where it was most beautifully made. About 1742 Thomas Bolsoner, a Sheffield mechanic, discovered that silver and copper could be fused together so that they would form one metal. He began to make experiments and invented the method by which silver plating was done for a hundred years, or until electroplating took its place. Silver plated in this way was so much more satisfactory and durable than electroplated ware that old pieces of Sheffield command prices almost equal to solid silver and there are many modern imitations.

Manufacture

While the manufacture of rolled plate has died out, there is so much genuine and imitation Sheffield plate now on the market that everyone should know how it was made.

First "ingots," or brick-shaped blocks of copper, were cast in molds. To prepare an ingot for plating, the top was filed or planed off until it was perfectly

smooth. A thin sheet of silver slightly smaller than the face of the ingot was then prepared and the surfaces of the copper and the silver were carefully cleaned. Then the silver sheet was placed on the copper, a piece of iron called a "bedder" was laid on top, and the ingot put on an anvil and hammered with a heavy hammer until the silver was bedded in the copper, touching it at every point.

A piece of sheet copper was then coated with whiting and laid on the silver and strong wire was wrapped tightly around to bind them together. A solution of borax was run around the edge of the silver to act as a flux and the ingot put into a stove heated with coke.

The door of the stove had a small hole in it through which the block could be seen by the plater. When a bright line appeared on the edge of the upper plate the ingot was carefully removed and allowed to cool gradually until the silver had set. If the copper was to be double-plated the same process was repeated for the other side of the ingot.

Finally, whether plated on one or both sides, it was taken to be rolled between two smooth, heavy rollers until it was the thickness required for the articles to be made from it.

Making of Sheffield Hollow-Ware

The sheet metal was then cut to the proper size

and the ends were dovetailed into each other and joined with soft solder, making a cylinder. The seam was hammered so that it was perfectly flat and almost invisible. In order to round or "belly out," the shape of the article, the cylinder was hammered from the inside with a weighted horn mallet. It was then put on a steel stake and hammered all over from the outside to make it smooth. For the final smoothing a piece of cloth was put on the stake and a fine steel facing strapped to the hammer.

The spouts of tea and coffee pots were shaped in the same way, and these were dovetailed and soldered in. If the piece had a flat bottom this was fitted in, dovetailed and soldered.

The mounts were stamped out of thin solid silver, filled with soft solder and bent to the proper shape. The article was painted with whiting around the place where the mount was to be attached and was then heated and the mounts pressed against it with cork until the solder in them melted just enough to adhere to the surface of the article. If allowed to melt too much the solder would run out.

When cool the whiting was washed off and the piece was ready for the silver edges. Some of these were simple silver wire drawn through a plate which bent it over on each side. It just covered the cut edge to which it was attached with solder. Other edges

were cut out of thin silver with dies and filled with soft solder, and still others were fluted or ornamented with designs in high relief. These were hammered and filed down to the body of the article in such a way that sometimes it was almost impossible to see the point where the joint was made.

Decoration

Piercing was often done by hand. If done by machine the edges were jagged or rough, needing to be filed and smoothed.

Engraving was done lightly in order that the silver might not be entirely cut away from the copper foundation.

The final process was burnishing which was done with polished steel instruments.

The insides of coffee and tea pots and the bottom of trays or stands were often tinned instead of being silver-plated. The surface was cleaned with acid and sprinkled with sal ammoniac. Melted tin was then poured over it and wiped off with cotton waste.

The inner surfaces of sugar bowls and cream jugs, snuff boxes, and other articles were gilded. Pure gold was melted with mercury (1 part gold to 5 of mercury) in an iron ladle which has been coated inside with whiting. When the gold and mercury had united, the amalgam was poured into cold water forming a paste

which was put into a leather bag. Part of the mercury escaped through the pores of the leather, leaving the soft gold with a small amount of mercury behind. The article to be gilded was painted with nitrate of mercury and then with the gold amalgam and laid, gilded side up, in a pan over a coke fire until the mercury evaporated and left a beautiful gold-plated surface.

Design

The designs of Sheffield plate vary from the very simple to the ornate and florid. They were copies of designs in solid silver with certain characteristics, like the wire and beaded edges, which resulted from their particular necessities of manufacture.

Modern Sheffield

Sheffield plate was manufactured in large quantities for over a hundred years and, unlike electroplated ware, it is very durable. For this reason it can still be obtained by those who are willing to hunt for it in antique shops and is sometimes for sale in jewelry departments.

It is prized by those who appreciate good solid workmanship and do not wish the expense and care of solid silver. This popularity has caused dealers to advertise "Sheffield" plate, which is merely an electro-

plated imitation. There is some electroplated copper, but it is not rolled plate and is not very satisfactory. Nickel, or white metal, is a far better base for electroplating.

Imitations of Sheffield.

Modern Sheffield, therefore, is only electroplated ware in Sheffield designs. It may be excellent plated ware but it differs from the old Sheffield in a number of ways.

1. There is far less silver on it. Even quadruple plate is thinner than the sheet of silver on the rolled copper.

2. It is made by machine processes and therefore lacks the individuality and finish of the hand-wrought article.

3. Nickel is a less malleable metal than silver or copper and its rigid hardness affects the texture of the finished piece. Gold, silver, copper, aluminum, and wrought iron, which can be hammered or drawn into shape, are not only tougher than cast metal but have a distinctive quality about them which is very clear to the trained eye and hand, though hard to define.

Solid silver is still costly. Thin or filled silverware is easily bent and broken and more substantial pieces are beyond the reach of the average purse. Their intrinsic value makes them also a serious responsibility.

Many a family keeps its solid silver with its jewels at the bank, only taking it out on state occasions.

Between the costly sterling silver and electroplated ware, Sheffield plate would have a place. Because of the handwork and the greater amount of silver used, it is more expensive than the best quality of electroplate, but it is far less costly than solid silver and, if it were now being made, it would lose its "collector's" value.

Fortunately the old designs and dies are still in existence stored away and awaiting the time when there shall be sufficient demand for this substantial and beautiful ware to put it again on the market.

Pewter

Before the discovery of methods by which silver could be plated, tableware for all but the very rich was made largely of pewter. This was an alloy composed chiefly of tin combined with different quantities of lead or brass and sometimes small amounts of bismuth or antimony. Pewter vessels were made by hammering, casting, or spinning, and were sometimes of excellent designs. The first mention of pewter was in 1074 and it continued to be used until the early part of the nineteenth century, but its great vogue had declined some time before and the patterns were less suitable, being imitations of silverware.

The recent demand for pewter has been the occasion

of a revival of its manufacture, first to supply "antiques," and afterwards as a frankly modern commercial product. The best pewter was made in England where the modern ware is now manufactured.

Chapter XXVI

HISTORY OF SILVERWARE DESIGNS

Early Silverware

Complete table services of silver were used by wealthy Romans. In the British Museum is a Roman vessel of silver inlaid with gold, and small articles have been unearthed in Britain which date from the Roman occupation.

The Irish used silver for chalices and church ornaments during the Gothic period, and on the Continent it was more used in churches than in homes.

During the Renaissance silver was very elaborate. The forms were classic, reproducing Greek models, but they were covered with scrolls and finely modelled figures. The early Florentine patterns were artistic and not overelaborate, but later work was too much ornamented.

Period Silver

"Period" silver is commonly associated with France and England.

Louis XIV of France was influenced by the Renaissance, but the art of his time was essentially French.

Everything was massive with heavy but stately decoration. The silverware like the furniture was imposing rather than graceful. Characteristic decorations were garlands and masks.

Louis XV brought in a freer style which soon became lawless and wandering. The stately columns and garlands of the former period were replaced by shells, palm branches, and fantastic borders. Patterns were unsymmetrical and ornament "dissolved in curves."

With *Louis XVI* came a return to simpler and more classic forms. Shapes were again symmetrical and the decoration graceful but dignified. Garlands and bow knots were used with cupids and cherub's heads, while laurel and ribbon were found in the borders. The ornaments were treated with great refinement and delicacy.

The Jacobean period in England was about the same time as the Florentine in Italy, but the influence of the Renaissance was not so strong. The forms were rather heavy though well proportioned. Geometrical designs with shields and panels were combined with masks and scrolls. The edges were often undecorated. The godroon edge was most common.

The Early Georgian period was about the time of Louis XV. Some of the plainer shapes of the reign of Queen Anne were made, but the ruling styles

resembled the French designs of that time. Elaborate decorations were combined with simple godroon borders and the shapes were exaggerated and unsymmetrical, though not so lawless as the French.

The Middle Georgian period was a return to the classic, with urn and vase forms and engraving or flat chasing instead of repoussé work in the decoration. The edges or moldings were bead or thread instead of curves and high relief. It was the Adam period in furniture and decoration and much influenced by a study of Grecian and Roman art.

The Late Georgian period was heavier and less refined than the preceding one. Decoration was again in relief, the grapevine being much used for borders, which were made of cast metal applied with solder. Fluting was also used and flowers and shells in raised patterns.

The Colonial period in America showed the influence of the Middle Georgian in England. Some silver of that period was without any decoration, depending for its beauty entirely on the simple, graceful forms. When decoration was used it was either engraving or flat chasing in bands, wreaths, or other symmetrical designs.

Modern Designs

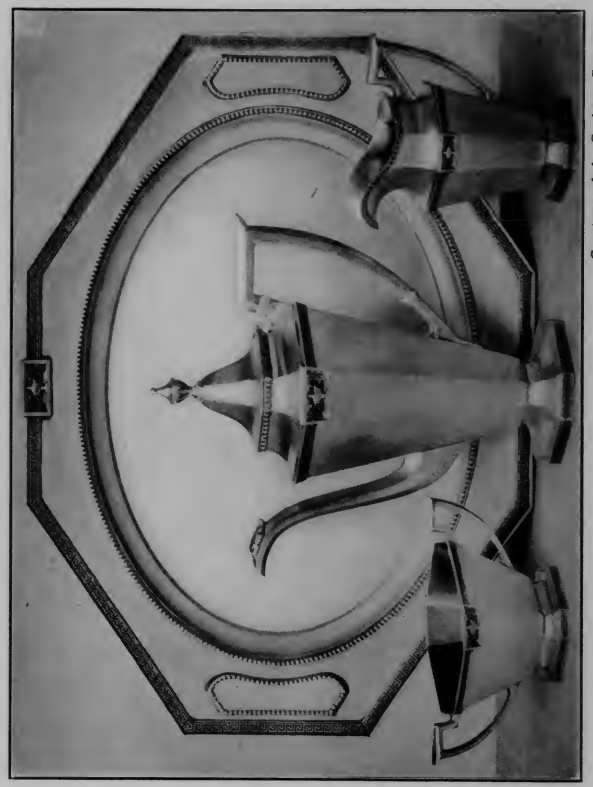
During the past century many attempts have been

made to create new designs in handicrafts instead of copying those of former periods. They have been successful to a certain extent. When the modern silversmith makes a Louis XVI or Jacobean or Georgian design he does not slavishly copy but works out patterns which will be of the same order as the furniture and decorations of that period, but may be quite original in subject and treatment.

Certain patterns are duplications or very slightly modified copies, such as the Buckingham or the King George in flat silver; others only suggest their earlier models.

Figure 12 shows a modified colonial pattern with Greek fretwork border and medallions of the Adam type.

As a new type of silverware in the modern art spirit we may mention the *Martelé* pattern designed for one of our great silversmiths. It is unconventional yet not so florid or extravagant as the Louis XV period and suggests in silver the flowing line, melting curves, and ethereal quality of art pottery. In this ware the fire scale has been retained and adds to the beauty of form and natural design a soft, dull texture as different from bright silver as the luster of the pearl is different from the brilliancy of the diamond.



Courtesy of the Gorham Company

Figure 12. Silver Coffee Set—Modified Colonial Design

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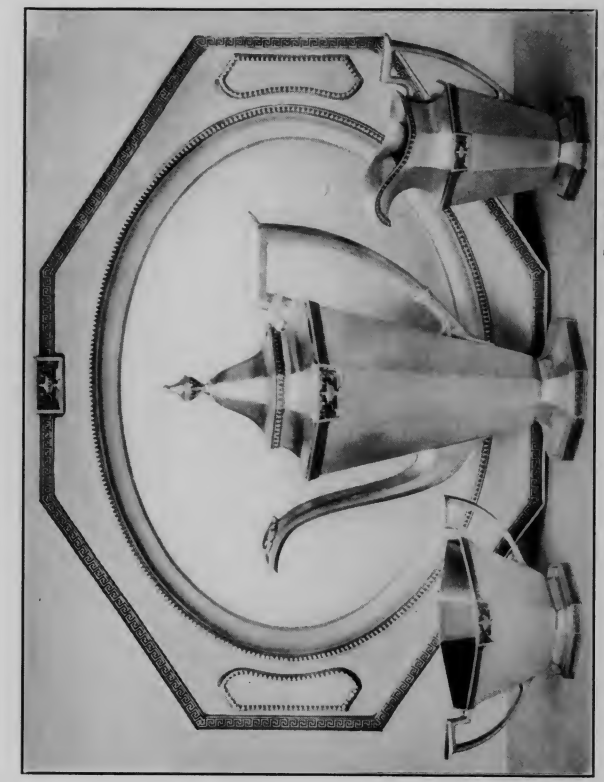

Courtesy of the Gorham Company

Figure 12. Silver Coffee Set—Modified Colonial Design

Good Design in Silverware

Silver is a beautiful material and the ware made from it should be beautiful, whether it is intended for practical use or for ornament. It may be said of silverware as of jewelry that a small number of fine pieces are far better than a quantity of cheap or tawdry ones.

Nor is it a question of cost alone. Real gems or sterling silver may be found in pieces so badly designed that they appeal to no motive except the love of display, while far less expensive ornaments and plated ware may be truly artistic and suitable.

In silverware the form, decoration, and construction should not only be good but should be considered with reference to—

The material from which the article is made.
The use for which it is designed.
Its suitability to the owner's other possessions and manner of living.

Silver hollow-ware consists of vessels which are intended to hold food or drink and it should be suited to that purpose.

The basic forms date back to such natural models as the hollow hand, the egg, the hardened husks of fruits, nuts, and gourds, sea shells, and the horns of animals. Egg shapes, shells, and horns may often be

seen in simple or highly decorated forms of pottery or metal.

The shapes of vessels were also determined by primitive methods of manufacture. The oval or spherical shapes were determined by the motion of the potter's wheel or the spinning of metals on early lathes.

It is interesting to trace these suggestions of natural forms and hand-processes in the teapots or pitchers of a modern silver service and to realize how often our pleasure in certain shapes is due to these familiar associations.

In order to give us permanent pleasure a vessel must have the right proportions and good "lines." Many illustrations would be required to show why the outlines of some vessels are heavy and coarse, while others are graceful and charming. The only way to train one's taste in these matters is to study good models and compare the ones in question with them, trying to see wherein they differ. The Greeks were masters of form. Their vases, bowls, and urns were so perfect in outline that they have become the standards of the world.

Decoration

Many vessels of good or at least inoffensive shapes are spoiled by their decorations. The same principles apply as those outlined in Chapter XV on jewelry design, but, as silverware is for practical use and not

merely for ornament the decoration should show restraint and simplicity rather than extravagant or fanciful patterns. The period patterns to which we have referred were often beautiful but not always suitable to the purpose.

For a home of taste and refinement but without ostentation the patterns designed for French kings and princes is most inappropriate.

Colonial patterns are usually good because they are simple, but the more florid styles are often modified so that they lose the effect of elaborate and unsuitable decoration.

Good workmanship should be demanded of every article of this kind. Silverware is not bought like a hat for one season's wear. It should be of such material and so well made that it will last for years, if not for a lifetime. Vessels should have firm handles and spouts. Teapots and pitchers should pour easily. Standing vessels should stand firmly, and the mounts should not come off.

In flatware the shanks of spoons and forks should be solid and not bend under ordinary pressure. The shapes of bowls, of tines and handles should be those which give the greatest ease and satisfaction in practical use.

When these requirements have been met, we should then ask for beauty of form, finish, and decoration.

Chapter XXVII

CLOCKS AND WATCHES

Classes of Clocks

Clocks and watches comprise a large and important division of art merchandise, their first object being utility rather than decoration. Clocks vary in size from one that may be set in the top of a stamp box to the giant clock in the Metropolitan Tower, New York City. Watches have been made small enough to be covered by a silver dime, yet some of the watches of our ancestors were as large as an Oregon apple and almost the same shape.

The clocks found in a jewelry department do not include town clocks, which are built to order, or even office and school clocks, which are usually purchased of the maker or his agent. They are clocks for the home or for individual use and comprise:

Standing or grandfather clocks
Wall clocks
Shelf or mantel clocks
Table and desk clocks
Traveling clocks

Clock Parts

The parts of all clocks are very similar in design but

differ in size, material, and workmanship. They consist of a case containing:

1. A train of wheels moved by a weight or spring.
2. An escapement, to control speed.
3. A pendulum, to govern the time.
4. A dial marked with hours, minutes, and sometimes seconds. Around this dial turn the two (or three) hands which are connected with the train of wheels.
5. Striking machinery (not always present).

A watch differs from a clock in being governed entirely by springs and having no pendulum. The movements of some traveling clocks and of many table and desk clocks are really watch movements set in the clock case. In others the clock movement approaches that of a watch. Only a trained mechanic should work with the machinery of clocks, but everyone should have some knowledge of their construction, treatment, and care.

Standing or Grandfather Clocks

Tall or grandfather clocks are often controlled by weights which are drawn up when the clock is wound and gradually fall as it runs down. Some clocks of this type have a spring instead of weights and the spring is wound up with a key. As the weights fall or

the spring is unwound the train of wheels is set in motion and this motion is communicated to the hands and the face of the clock.

The minute hand is attached to a wheel which revolves once every hour. The hour hand rides on a hollow axis outside the minute hand and is attached to a wheel revolving once in twelve hours.

The weight attached to the wheels would tend to fall faster and faster as it went down, or if the clock has a spring it would unwind irregularly, if the speed were not controlled by pallets, which slip into the teeth on the edge of a governing wheel, called an "escape wheel," and govern its motion. The movement of these pallets is regulated by the swing of the pendulum and their form and action is called the "escapement" of the clock because their points enter and escape from the teeth of the escape wheel. The pallets are set in motion by the clock machinery and keep the pendulum going by a slight impulse, but the pendulum swing is due to the steady pull of the force of gravity, the upward pull of the machinery being just enough to bring it back to the end of the arc so that the fall is always the same.

Pendulums

The pendulums of these clocks are long rods hung on a steel spring with a bob near the lower end consisting of either a flat disc or a cylinder. The pendulum swings back and forth with a regular, rhythmic motion when the clock is in "beat." If the motion is irregular, one beat longer than another, or if a beat seems at times to be lost, there is something wrong with the clock.

The time occupied by each beat varies according to the length of the pendulum measured from the point where it is attached to the spring to about the center of the bob. A pendulum 39.14 inches long makes one beat a second, while a pendulum 9.8 inches long makes two beats each second. The first is called a "seconds" pendulum. One reason that these tall clocks keep such good time is that the beat of the long pendulum is more even than that of shorter ones.

Compensating Pendulums

Since the length of a pendulum determines the time of its beat, a clock's regularity is affected by heat and cold. Heat expands metals and therefore makes the pendulum longer, while cold, which contracts metals, makes it shorter. The difference in length is too small to be seen by the eye and almost too small to measure but a very tiny difference in the length of each beat will make a clock gain or lose several minutes in the course of a week.

Compensating pendulums are those in which the expansion and contraction are counteracted and the beat

kept regular. It must be remembered that the length is not the full length of the rod but only the distance to the center of gravity or weight on the rod. This is usually about the center of the bob, but it can be shifted to a place below the center when it is necessary to lengthen the pendulum, or above the center to shorten it.

The customary pendulums of this type are as follows:

1. The gridiron pendulum, has for its bob a series of 9 alternating steel and brass rods suspended in such a way that if the contraction of the steel rods pulls the center of gravity up, the brass will pull it down an equal amount.

2. The mercury pendulum, is the most expensive but the most reliable. The mercury is carried in glass vessels or in a cast iron jar at the lower end of the pendulum and by its weight and extreme contractibility compensates for the contraction of a long steel rod.

3. The wooden pendulum has a lead bob which rests loosely on a nut at the lower end. Wood expands and contracts much less than metal and the lead bob expands upward enough to compensate for this expansion of the wood downward.

4. The zinc and iron pendulum consists of two tubes on the pendulum rod. The inner tube is of zinc which rests on the nut at the lower end of the rod and slides

freely up and down. The outer tube is of iron and has its weight suspended from a projection or collar on the top of the zinc tube. The lead bob is attached to this iron tube. As the iron rod and outer tube expand downward the zinc expands upward nearly twice as much, compensating for both of them.

Grandfather clocks do not all have compensating pendulums, but the long thin wire and heavy bob makes their variation exceedingly small.

Striking Mechanism

The simplest striking machinery consists of a bell and a hammer which is moved by a spring. The spring in its turn is released at certain times by the action of the time-keeping machinery. In modern clocks the striking machinery is wound separately and chime clocks have an extra train of wheels. Alarm clocks are set to ring at a certain hour but the hammer may be prevented from striking.

Clock Materials

Clock machinery is nearly always of brass. The dials are of polished brass on which the figures are engraved and filled in with sealing wax, after which they are "silvered," or painted with a thin coat of nitrate of silver. On illuminated dials the numbers and hands are painted with a special paint containing

a form of radium which enables the time to be read in the dark. The hands are of steel, sometimes beautifully pierced and "blued" by tempering with heat.

Clock Cases

Hall clock cases are of wood or of wood and glass. Sometimes they have trimmings of brass. Very costly clocks are made with a polished wood framework holding together the plates of glass which compose the front and sides of the case. The works are highly polished and the dial decorated with "spandrels" or corner ornaments of ormolu, or wrought brass.

Solid wood cases may be straight sided or tapering slightly toward the top. They are usually of mahogany or of wood stained to look like mahogany. Black oak is also used.

Wall Clocks

There are two types of wall clocks which are commonly used, the round or square clocks with their large white dials and figures which can be seen at a considerable distance, and those with a simple case about the length of a seconds pendulum below the dial. Many round clocks have no pendulums. Neither of these types is likely to be found in a jewelry department.

Cuckoo clocks are made in Switzerland and also in Germany. They are of wood fancifully carved to look like a Swiss chalet and are wound with weights. The works are of wood. On the hours and half-hours a little door flies open and a wooden cuckoo is seen while the clock makes a sound supposed to resemble the cuckoo's note.

Regulators

Regulators are clocks which have been constructed very carefully to ensure accuracy. They are used in observatories and other places where accuracy is essential and for "master" clocks which control other timepieces by electrical connections. They have mercurial seconds pendulums. Regulators may be either standing or wall clocks.

Mantel Clocks

Mantel clocks are found with pendulums and without them. Those without pendulums are regulated with levers. Many of the best mantel clocks are made in France. Some are very elaborate. The dials are beautifully enameled and the hands gilded. The cases most often seen have a brass framework and glass sides with perfectly simple but well-proportioned and satisfactory lines. Since the war these clocks are very hard to obtain. An American clock of similar appearance has taken their place.

Ornamental mantel clocks may have good movements but they frequently do not. The French ornamental clocks have excellent works as well as elaborate cases, but the American imitations are not of the same type inside. They may be ornamental but they are not very useful. The cases are made of marble, onyx, alabaster, malechite, porcelain, ormolu, and bronze, sometimes plated with silver or gold but usually decorated with ormolu trimmings.

A three-piece mantel set consists of a clock and two vases, or a clock and two candlesticks to match.

Whatever the style of the clock case, a pendulum clock is more reliable than a lever clock and is more easily regulated.

Electric clocks have a pendulum consisting of a steel rod with two bobs attached to a cross-piece at the lower end. These bobs swing with a circular motion instead of back and forth. The pendulum is controlled by an electric battery.

Table and Desk Clocks

These are smaller in size than mantel clocks, some of them exceedingly small. There are inexpensive ones intended for service and highly ornamental fanciful ones.

The easel clock has a small case enclosing its works set in a sort of frame of silver, gilt, tortoise shell, or

enamel, and tipped back with a support similar to those on standing photograph frames.

Fanciful little clocks are set in the top of stamp boxes and in other odd ways. Desk clocks are made to match the other fittings of the desk set—brass, silver, enamel, celluloid, or leather, as the case may be.

Traveling Clocks

Traveling clocks have hair-springs instead of pendulums, so that they may be carried in any position. Some are small French clocks of glass and burnished or gilded brass, plain but with very fine works which make them costly. These are imitated in an American clock of the same general appearance but very different construction. The movements differ but little from those of watches. Others are really watches set in a three-leafed case. They are quite flat when the case is closed and when it is open they are supported, easel-fashion, by one side of the case and the inside leaf. They are made of the same material as easel clocks and many of them are very elaborate.

Watches

A watch movement is too intricate to describe in a manual of this kind. Not only does a spring take the place of a pendulum but the machinery is more complicated than clock machinery.

Watch cases are made of gold, silver, platinum, and gunmetal. The gold cases may be 18 or 14 karat gold, gold filled, or guaranteed plate. The cases are decorated with enamel in many forms and are also engraved and carved. Platinum watches are studded with diamonds and other gems.

The "jewels" in a watch movement are real, tiny gems—rubies, diamonds, sapphires, garnets, and quartz. They are used in the watch bearings because of their hardness and the value of a movement is somewhat dependent on the number of jewels in it. Full-jeweled watches have 23 jewels. The smallest number in an American watch is 7, but Swiss watches are said to be made sometimes with one. Watch movements are now so perfected that even very small watches will keep excellent time, though the machinery is too delicate to wear so long a time as the medium sizes.

Among women, pocket watches on chains have almost disappeared. The watches generally worn are either bracelet or strap wrist watches, or pendant watches, very small and hanging from a small chain. The latter are often pear-shaped with the point of the pear either up or down. Novelty watches are seen for rings and some have been worn on the ankles. They are also worn suspended from brooches instead of chains.

The convenience of the wrist watch was demonstrated during the war and since 1914 the fashion has

been popular among men. Men's wrist watches are of silver or gunmetal and are worn on a strap.

Men's watches, except those for the wrist, are no smaller in diameter than they have been for many years, but they are exceedingly thin and light.

History of Time Measurement

The ancients measured the time of day by the sun. We find sun dials on walls and pavements as well as on raised standards in old ruins.

The water clock was probably the first instrument by which time was measured by mechanism. It was used as early as 140 B.C. A water clock of the seventeenth century consisted of two posts with a bar connecting them at the top. On this bar was wound a cord attached to a weight. The weight was carried down by gravity but regulated by the dripping of water drop by drop from a drum. As the weight descended it pointed the hours which were marked on the posts.

First Timepieces

The first timepieces of which we have any definite knowledge were made in the fourteenth century. These early clocks were often fantastic. The first of the celebrated Strassburg clocks was made in 1350. These clocks all had mechanical devices by which puppets came out when the hour was struck, horsemen struck

their lances, or apostles filed across the front of the dial. The great clock still existing in the city of Rouen, France (Figure 13), tells the hours, days of the week, and phases of the moon.

The machinery of these early clocks consisted of a system of wheels and balances which were not very accurate. A coiled spring was substituted for the weights in 1500. The pendulum was introduced in 1657.

When clocks were run by hanging weights they were stationary but after the introduction of the spring they were portable. As these clocks had only one hand it was not so necessary that they keep exact time, but after the invention of the pendulum the compensating pendulums soon followed, the mercurial in 1721 and the gridiron in 1726. Wall sweeps or "wag on the wall" were made like grandfather clocks except that they had no cases. The first ones were sent to England from Holland without the cases to save expense and hung up that way—perhaps by mistake.

American Clocks

Among the early American clock-makers was William Davis who came to the United States in 1683. His clocks had wooden works. So did the Terry clocks made by the firm of Eli Terry, Seth Thomas, and Silas Hoadley, formed in 1809. Seth Thomas,

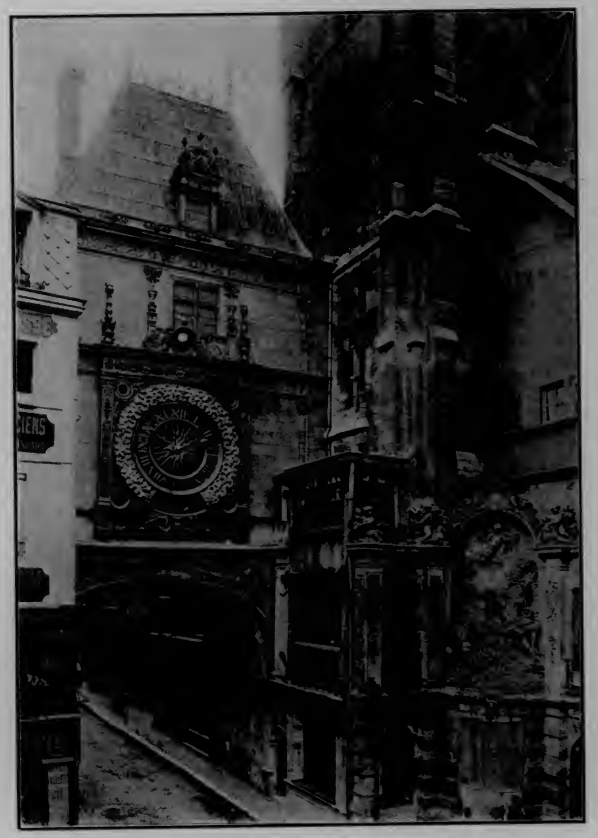

Figure 13. The Great Clock Tower at Rouen

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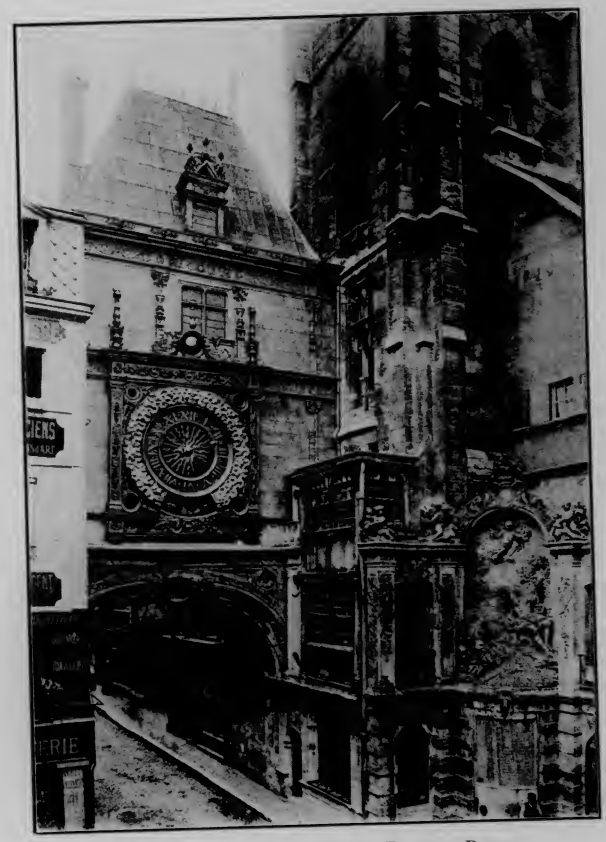

Figure 13. The Great Clock Tower at Rouen

perhaps the most celebrated of the old makers, was born in Connecticut in 1785 and died in 1859. The company he founded exists today and makes some of our best clocks.

The largest clock in the world, and one famous also for its beauty, is in the Metropolitan Tower, New York City. It has four dials made of reinforced concrete faced with blue and white vitreous tile. The dials are 26 feet, 6 inches in diameter and the figures are 4 feet high. The minute hands are 17 feet from end to end and weigh 1,000 pounds; the hour hands 3 feet, 4 inches and weigh 700 pounds. They revolve on roller bearings and are run by electricity. A master clock in the directors' room controls this and a hundred other clocks. The chimes are those composed by Handel for the clock at Cambridge, England. The big bell which strikes the hours weighs 7,000 pounds. The lantern which flashes the hours at night is 8 feet in diameter and its light can be seen at sea. It was made by the Self-Winding Clock Company, Brooklyn.

History of Watches

As the invention of the main spring (1500) made portable clocks possible, the balance spring (1658) brought the pocket timepiece or watch. Old watches, however, were very clumsy, being about 2 inches thick and some were even larger. The cases were carved,

enameled, and studded with gems. They were not only made of gold and silver but of tortoise shell. The cases were so beautiful and fragile, however, that an outer case was required often made of shagreen leather, a thick leather into which dried seeds were trodden to give it a pitted surface. It was stained green with sal ammoniac and copper filings. Pinchbeck cases were made from an alloy resembling gold, which was invented by Christopher Pinchbeck in 1721.

Chapter XXVIII

BRONZE AND IVORY ORNAMENTS

Kinds of Bronzes

Bronze may vary considerably in its composition and color. Some bronzes appear almost jet black but with a slight shading in their metallic luster. From this they shade to browns and greens and even grays with a silvery luster.

Some European and American bronzes may be seen, but in these bronzes the metal is usually cast in figure molds from models made by artists and is necessarily expensive.

Japanese Bronzes

The bronzes to be found in an art department are usually of Chinese or Japanese origin, especially the latter, as the Japanese are the most skilful and artistic bronze-makers in the world. They use two different alloys: One is 3 parts gold and 97 parts copper; the other is one-third silver and two-thirds copper. A bronze, called by them "Chinese metal," is made of copper, lead, and tin.

The finest, or gold bronze, after it has been given what is called the "patina" treatment, consisting of

boiling in lye, dipping in plum vinegar and salt, boiling again with copper sulphate, and polishing with charcoal, becomes a beautiful black with a sheen of violet. The silver alloy may be gray, red, or brown.

The Japanese value the artist's work not so much for the design as for the chisel cuttings. They have thirty-six different classes of chisels and a number of varieties in each class. They punch microscopic dots in straight lines to make "fish roe" backgrounds, and sometimes the surface has crossing lines which look like a straw mat. The relief may be low, medium, or high. That is, the figures may stand out a very little from the background or they may be raised quite high. They do an exquisite kind of fine carving like engraving. The "kati-kiri-bori" is a kind of brush work done with the chisel. It is very fine and no changes can be made.

Much of the bronze is cast, and the chisel is only used to finish it off.

Damascening

The Japanese inlay gold, silver, and metal alloys in their bronze. The process is called by western nations "damascening," or "damaskening," as the earliest specimens of this type came from Damascus.

Damascening is done in three different ways. According to the first method the foundation metal is

engraved with undercut lines; that is, the cutting is made beneath the surface and a thread of gold or silver is forced in by hammering or pressed by the burnisher. By the second method the metal to be encrusted is held between slightly raised walls in the foundation metal.

The third method consists in roughing the foundation metal with a sharp tool and then pressing or hammering thin layers of gold or silver on it. This is the latest and least durable form of damascening. Sometimes holes are punched in the background and points of the inlaid metal are punched through, serving as keys to hold it on. Damascening is not only used in oriental art objects but also in jewelry.

Oriental Design

Chinese and Japanese bronzes are often very elaborate and sometimes grotesque. The dragon is a favorite subject for design and may be seen writhing over vases and lampstands, showing his teeth or spreading his claws on all sides. Tiny pagodas, or temples, and images of oriental gods are also common. Little animals and birds, especially monkeys and long-legged cranes, are found in Japanese figurines.

Imitation Bronzes

A composition metal made of very refractory clays

by a secret formula and painted with a metallic coating has all the surface effect of bronze. It often looks so much like the real metal that one must tap it with a pencil and hear the dull flat response instead of the ring of the true bronze, or must handle and feel its dead weight in order to be sure that it is only an imitation. It is a modification of the old lusters.

Really beautiful statuettes and vases are made in this "metalized" pottery, which comes under various trade-names. The appearance gives no indication of the strength of the object, as clay which is exceedingly strong and resistant may be given the same surface effect as a piece of plaster of paris.

French art bronze is iron painted with a brown metallic composition. It has a hard surface which is less like true bronze in appearance than the metallized pottery. It is seen in statuettes and busts of French design.

Ivory Ornaments

Ivory has always been a costly as well as a beautiful material much used for ornamental purposes in the Far East, and to a lesser extent in western countries. It is obtained from the tusks of the African male elephant, or from those of either the male or the female in India. These tusks are simply the modification of two of the animal's teeth and are a little harder than

bone but not so brittle as horn. The substance is very dense, with circular wavy lines which show the layers of dentine and fine radiating lines cross these, giving ivory its beautiful delicate shading and distinguishing it from the imitations made from celluloid.

Ivory is easy to work and polish, and can be carved into marvellous little figures that must be examined under a microscope to see their perfection. These tiny statuettes are either Chinese or Japanese, but the latter are the best. Sometimes they are very funny or grotesque, sometimes, dignified. They are called "netsukes." Boxes, caskets, paper knives, and knife handles are often covered with lacelike carving.

The Chinese make puzzle balls, one inside of another, by an ingenious and difficult method. Out of a block of ivory they first make a rough ball, then bore holes in it to a certain depth and work with bent steel tools around each hole until each shell is separated from the next smaller one. The balls are not really very perfect, but the ornamentation hides the imperfections.

Ivorine, French ivory, etc., are made from celluloid tinted and veined to look like ivory.

Brass and Dutch Metal Ornaments

Brass and Dutch metal are combinations of copper and zinc. Brass is more fusible than copper and therefore casts better. It is yellower than copper and

will take a fine polish, but tarnishes very easily. If dipped in nitric acid and lacquered with varnish, the surface is protected.

Many articles in an art department are made of brass: vases, jars, candlesticks, smokers' sets, library sets, small boxes, and a great variety of small articles.

Heavy brass objects are usually cast, but many smaller pieces made of thin sheets hammered are bent into the proper shape, sometimes over wooden foundations.

Brass is often decorated by "hammering." The sheet of metal is placed over a lead or a wooden block, and the design worked into it from the under side with hammers and small punches. Occasionally it is worked down from the right side. It is also cut or stamped out with dies.

Dutch metal has different proportions from those of brass, but is somewhat similar to it.

Teakwood

Teakwood is used for the carved stands upon which oriental vases and figurines are placed. The teak tree grows in southeastern Asia and the Philippine Islands. The wood is golden yellow which turns to brown as it ages. It takes a beautiful polish and is soft enough for carving.

Silver Ornaments

Silver candlesticks and candelabra are of three general styles:

Colonial, with simple lines and little ornamentation.

"Period" designs (see Chapter XXVI).

Dutch silver, covered with landscapes, figures, and other decorative designs in high relief.

The decorations may be in the form of mounts soldered on and smoothed down, as in hollow-ware, or the whole candlestick may be hollow. The latter are made by pouring the metal into molds with a core which crumbles as it dries and is easily removed, or by stamping out the design, bending, and uniting with silver solder.

Dutch silver is the name given to a style rather than to a material. It may be pure silver of sterling quality, or it may be electroplated ware, but it is always made in ornate, repoussé designs. Solid silver in these designs is imported from Holland where it originated and appears in every kind of hollow- and flat-ware, vases, épergnes, salvers, boxes, spoons, and knives and forks.

Chapter XXIX

SUGGESTIONS TO SALESPEOPLE AND CUSTOMERS

Care of Stock

The suggestions given as to the care of jewelry stock should also be applied to the Silverware Department stock.

Absolute shining cleanliness and order have much to do with its attractiveness and are also necessary to prevent deterioration. The finer finished silverware is scratched and marred very easily, and the articles must be kept free from dust and wiped with clean cloths.

Silver is quickly discolored by sulphur which is usually present in small quantities in the air. Cases should therefore be kept tightly closed and the silver examined frequently for traces of tarnish. When this appears it must be quickly removed both to protect the silver and make it salable.

Cleaning Silver

Tarnish is removed from silver by the use of a powdered earth called by various names, such as tripoli, rottenstone, electro-silicon, and diatomaceous earth. It is nearly as hard as sand but very fine

grained. Whiting is finely powdered English chalk. It is the basis of nearly all silver polishes.

Electrical silver cleaners consist of aluminum plates which are put into boiling water in which baking soda or salt have been dissolved. The chemical reaction releases hydrogen which unites with the sulphur and leaves the silver clean.

The same effect may be secured by putting the silver article in an enameled pan containing baking soda or table salt and a piece of either zinc or aluminum. The silver must touch the other metal in order to produce the reaction. Solid silver may need to be rubbed because it contains more alloy than the surface of plated ware.

Gold-lined pieces must not be allowed to remain in the solution. (See "Housefurnishings Manual" for further information on cleaning materials.)

Cleaning Artificial Ivory

Artificial ivory should be cleaned with a cream which is prepared for the purpose and which removes slight scratches as well as giving it a polish. Alcohol should never be used as it dissolves celluloid.

The Care of Clocks

In order that clocks may keep good time they must be properly hung. The clock must be "plumb" on the wall or stand.

The vibrations of the pendulum must be equal and one should listen to the sounds of the wheel teeth for scraping. The rod should hang in the center of the loop in the crutch wire, the forked support of the escapement. If it rubs the front or back end of the loop the friction will stop the clock. If the wire is bent or misplaced the clock will stop.

If the clock creaks it may need a drop of oil but it should not be oiled too often. Only watch oil should be used. The best comes from the jaw of the porpoise.

Knowledge of Manufacture

Salespeople should have a knowledge of the manufacture of silverware, as many questions are asked by practical housekeepers about the wearing qualities of different kinds. They also should know of the hand-processes used in making fine sterling ware because these account for its high cost. They should be able to answer questions about Sheffield correctly and should know how to distinguish between different grades of plate.

Period Silver

Many people wish to furnish their dining-rooms in accordance with a certain historic style or period. The silver selected should be in keeping with their furniture and other appointments. Both salespeople and

purchasers who are chosing the silverware for such a dining-room should know the characteristics of the period. Very often the name of the pattern will not be very helpful, as it is coined for the purpose and might apply to one of several quite different periods. On the other hand, the type actually used during that period may be too ornate for the purpose of the modern house. A real acquaintance with the characteristics of the time, its art, and its atmosphere, will make an intelligent and suitable choice possible though the pattern be a modern one.

Chapter XXX

CLASSIFICATION OF SILVERWARE, CLOCKS, WATCHES, AND ORNAMENTS

DIVISIONS

A. Hollow-ware (Sterling and Plated)
B. Flat-ware (Sterling and Plated)
C. Toilet Articles (Sterling and Plated)
D. Clocks
E. Watches
F. Ornaments

A—HOLLOW-WARE

1. Articles
   (a) Trays
      Asparagus
      Bread
      Cocktail
      Sandwich
      Serving
   (b) Dishes
      Bon bon
      Butter
      Cheese
      Cracker and Cheese
      Fern

      Fruit
      Meat
      Pie
      Pudding
      Vegetable
   (c) Cups
      Butter
      Children's
      Coffee
      Collapsible
      Egg
      Loving
      Ramekins
      Sherbet
      Syrup
   (d) Jars
      Horse Radish
      Jam
      Mustard
   (e) Plates
      Bread and Butter
      Cheese
      Chocolate
      Coffee
      Hot Water
      Meat
      Pap Bowl and Plate
      Serving
      Syrup
      Tea
   (f) Sets
      Almond
      Breakfast
      Egg
      Fruit

Ice Cream
Lemonade
Muffin
Salt
Water
(g) Miscellaneous
Baskets
Bottle-holders
Siphon
Catsup
Bottles
Carafe
Decanter
Water
Bowls
Candelabras
Candlesticks
Casseroles
Casters
Centerpieces
Chafing Dishes
Cheese-cutters
Cocktail Shakers
Compotes
Egg-boilers
Glasses
Gravy Boats
Mayonnaise Dishes
Percolators
Pepper-mills
Pitchers
Syrup
Water
Plateau
Plate-holders

Soup Tureens
Stoves
Alcohol
Electric
Sugar
Baskets
Sifters
Tea Caddies
Thermometers
Trivets
Toast Racks
Water Kettles

2. Manufacture
(a) Sterling
Hand-wrought
Commercial
(b) Plated

3. Decoration
(a) Etched
(b) Engraved
(c) Chased
(d) Repoussé
(e) Pierced
(f) Enameled

B—FLAT-WARE

1. Articles
(a) Spoons
Baby
Berry
Bon Bon
Coffee
Dessert

Five O'clock Tea
Ice Cream
Iced Tea
Ice or Pea Serving
Jelly
Lemonade
Medicine
Mustard
Olive
Orange
Salad
Salt
Soup
Sugar
Table
Tea

(b) Forks
Berry
Cold Meat
Dessert
Fish
Fruit
Ice Cream
Olive
Oyster
Pastry
Pie
Salad
Sandwich
Table

(c) Knives
Dessert
Dinner
Fish
Fruit

Grapefruit
Orange
Pie
Tea

(d) Tongs
Asparagus
Bon Bon
Ice
Sandwich
Sugar

(e) Servers
Cake
Cheese
Pie
Tomato

(f) Ladles
Cream
Gravy
Oyster
Punch
Soup

(g) Sets
Carving
Children's
Fish
Ice Cream
Salad

(h) Miscellaneous
Butter
Knives
Picks
Spreaders
Bottle-holders
Call Bells
Cheese Scoups

Corn-holders
Food-pushers
Napkin
Clips
Rings
Nut
Crackers
Picks
Knife Rests

2. Manufacture and Decoration. [See A (1) and (2) above.]

C—Toilet Articles

1. Articles

(a) Atomizers
(b) Boxes
Jewel Cases
Soap
Talcum
Tooth Brush
(c) Brushes
Baby
Clothes
Hair
Hat
(d) Combs
(e) Hat Pin Holders
(f) Jars
Cigar
Cigarette
Cream
Salve
(g) Manicure Articles

(h) Mirrors
Hand
Standing
(i) Perfume Bottles
Sets
Single
(j) Pin
Cushions
Trays
(k) Sets
Cordial
Infants'
Lavatory
Manicure
Smoking
(l) Shaving Brushes
(m) Smelling Salts

2. Manufacture and Decoration. [See A (1) and (2) above.]

D—Clocks

1. Articles

(a) Standing or Grandfather
(b) Wall
(c) Shelf or Mantle
French
American
English
German
(d) Table and Desk
(e) Traveling

2. Materials. [See F (2) below.]

3. Manufacture
   (a) Works
      Handwork
      Machine-work
   (b) Cases
      Cast
      Assembled

4. Decoration
   (a) Carved
   (b) Inlaid
   (c) Engraved
   (d) Enameled
   (e) Lacquered
   (f) With Ornamental Mounts

E—Watches

1. Kinds
   (a) Pocket
   (b) Wrist
      Bracelet
      Strap
   (c) Pendant
   (d) Ring
   (e) Novelty Shapes

2. Movements
   (a) Number of Jewels: 7 to 23
   (b) Kinds of Jewels
      Ruby
      Diamond
      Sapphire
      Garnet
      Quartz

3. Faces
   (a) Gold
   (b) White Enamel

4. Cases
   (a) Gold: 14 to 18 Karats
   (b) Gold-filled
   (c) Silver
   (d) Gunmetal
   (e) Platinum

5. Decoration
   (a) Enameled on Silver
   (b) Niello
   (c) Hand
      Carved
      Colored
      Engraved
   (d) Precious stones
   (e) Mother-of-pearl

F—Ornaments

1. Articles
   (a) Boxes and Novelties
   (b) Busts
   (c) Candlesticks
   (d) Desk Fittings
   (e) Figurines
   (f) Library Sets
   (g) Smokers' Sets
   (h) Statuettes
   (i) Vases

2. Materials
   (a) Metals
      Gold
      Silver

Gunmetal
Copper
Brass
Bronze
Nickel
Steel

(b) Stones
Alabaster
Marble
Malachite
Serpentine
Onyx
Agate
Jade
Lapis Lazuli
Azurite
Marcasite
Rhodonite

(c) Woods
Ebony
Teakwood
Mahogany
Oak
Lacquered soft woods

(d) Other Materials
Enamel
Ivory
Mother-of-pearl
Horn
Bone
Amber
Lignite
Pottery
Glass
Rock Crystal

3. Manufacture
(a) Hand-carved
(b) Modeled
(c) Turned
(d) Spun
(e) Cast

4. Decoration
(a) Carving
(b) Engraving
(c) Inlaying
(d) Enameling
(e) Ornamental Mounts
(f) Studded with Stones

Appendix

Books for Reference

Gem Stones, G. F. Herbert Smith. Pott, $2
Book of Precious Stones, J. Wodiska. Putnam, $2.50
The Curious Lore of Precious Stones, George Frederick Kunz. Lippincott, $5
Precious Stones, W. Goodchild. Van Nostrand, $2
The Pearl, W. R. Cattelle. Lippincott, $2
The Diamond, W. R. Cattelle. Lippincott, $2
The World's Minerals, L. J. Spencer. Stokes, $2
The World's Gold, L. DeLaunay. Putnam, $1.75
Silverwork and Jewelry, H. Wilson. Appleton, $1.40
Silver for the Dining Room—Selected Periods, J. S. Holbrook. Univ. Press.
Simple Jewelry, R. L. B. Rathbone. Van Nostrand, $2
Jewelry, H. Clifford Smith. Putnam, $7.50
Jewelry, C. J. H. Davenport. McClurg, $1
The Art of the Goldsmith and Jeweler, T. B. Wigley. Lippincott, $2.75
Enamelling, L. F. Day. Scribner, $3
Handbook of Ornament, F. S. Meyer. Hessling, $3.60
Nature and Ornament, L. F. Day. Scribner, $3
Pattern Making, L. F. Day. Scribner, $3
Line and Form, Walter Crane. Macmillan, $2.25
Bases of Design, Walter Crane. Macmillan, $2.25
Autobiography, B. Cellini. Dutton, 35 cents
Metal Work and Enamelling, Maryon. Scribner, $3
Art Metal Work, Arthur Payne. Manual Arts Press, $1.50
Metal Working, P. N. Hasluck. McKay, $2.50
Divers Arts, Theophilus. (Out of Print)
Chats on Old Jewelry and Trinkets, M. Percivale, Stokes, $5
Old Clock Book, N. Hudson Moore. F. Stokes & Co.
Sheffield Plate, Bertie Nyllie. B. T. Batsford.
American Watchmaker and Jeweler
Great Industries of the United States (Trade Journal)
The National Jeweler and Optician (Trade Journal)
The Jewelers' Circular Weekly

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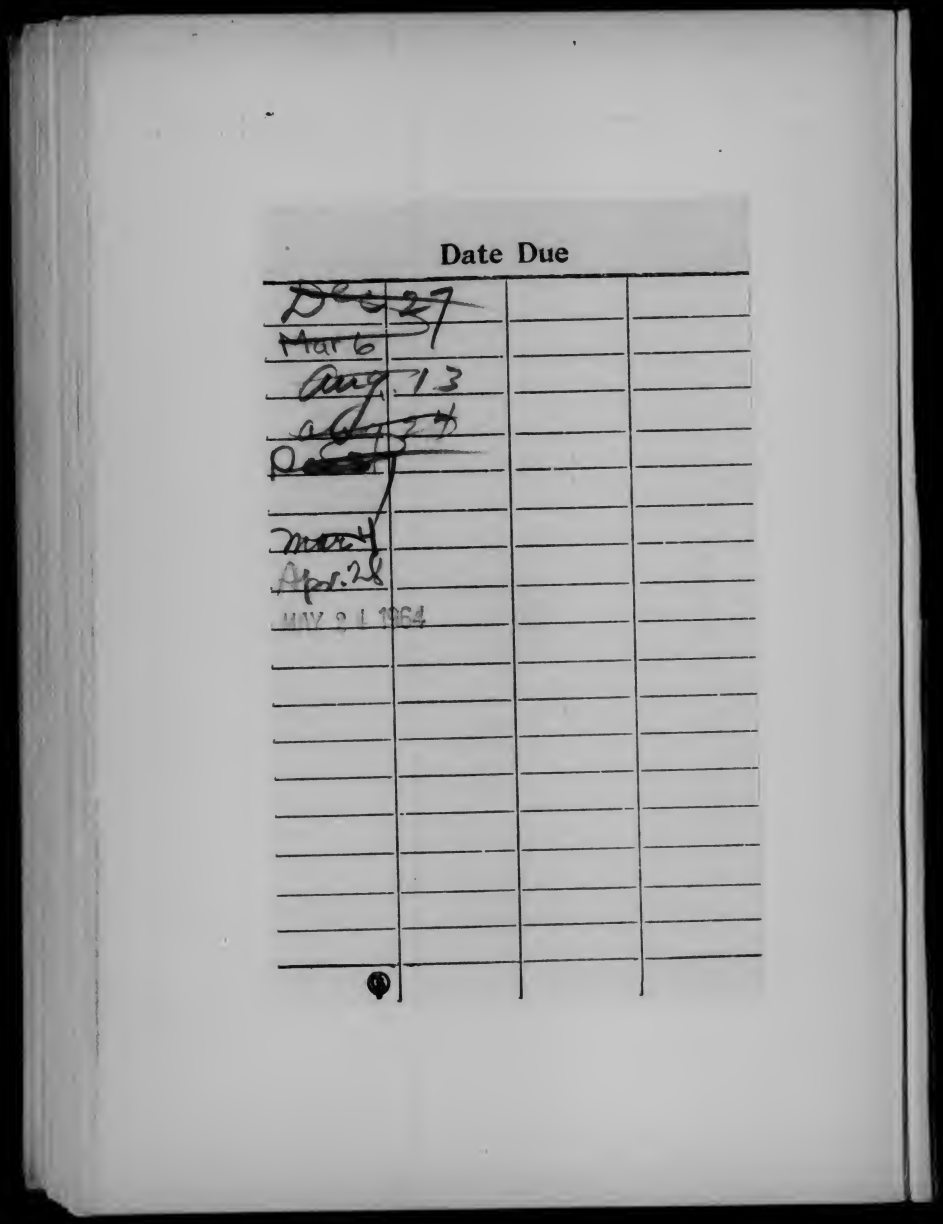
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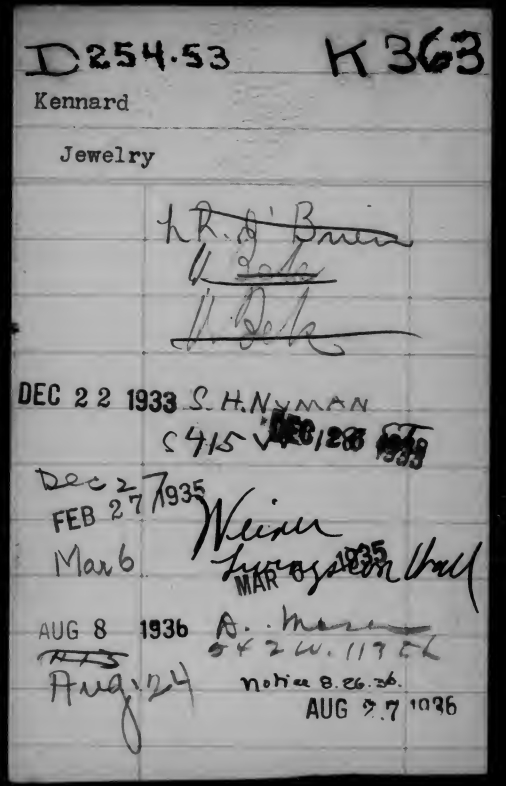
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